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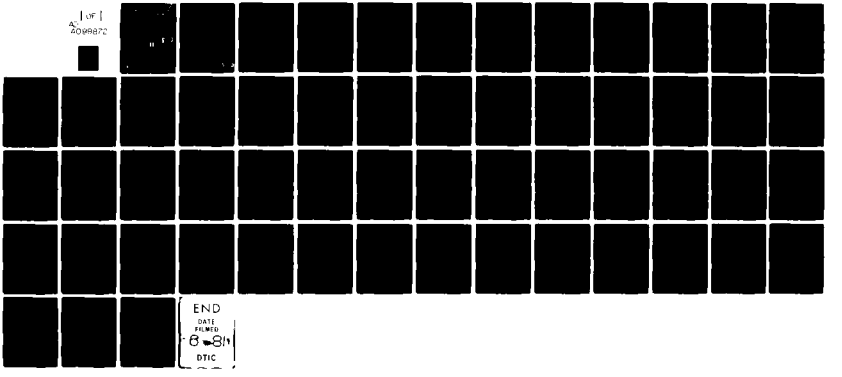

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NEW YORK AIRPORTS

DATA PACKAGE NO. 9

JOHN F. KENNEDY INTERNATIONAL AIRPORT
LA GUARDIA AIRPORT

AIRPORT IMPROVEMENT TASK FORCE DELAY STUDIES

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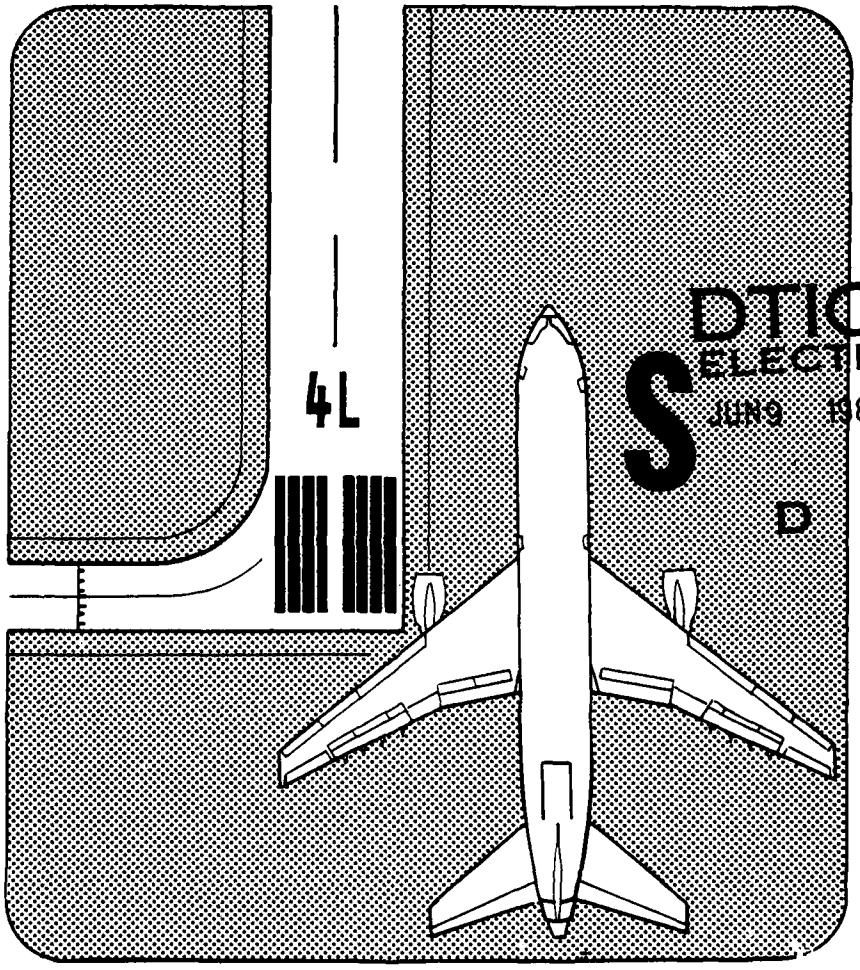

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PEAT, MARWICK, MITCHELL & CO.
P. O. BOX 8007
SAN FRANCISCO INTERNATIONAL AIRPORT
SAN FRANCISCO, CALIFORNIA 94128
Telephone: (415) 347-9521

February 23, 1980

Mr. Michael M. Scott, ATF-4
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, D.C. 20591

Re: New York Data Package No. 9, February 1980

Dear Mike:

Attached is New York Data Package No. 9. The material in this Data Package is divided into sections as follows:

- Attachment A presents a corrected comparison of LaGuardia (LGA) Experiments 2 and 9;
- Attachment B presents the results of two new LGA sensitivity runs, Experiments 54 and 55, which reflect both 1978 GA traffic and 1978 ATC separations in 1982 and 1987, respectively,
- Attachment C has the revised results of the LGA west taxiway experiments,
- Attachment D contains the results of several sensitivity tests of the west taxiway experiments, and
- Attachment E is a summary of case-specific separations.

This information should be reviewed by members of the New York Task Force at their February 26, 1980, meeting.

Sincerely,

Stephen L. M. Hockaday
Manager

SLMH/mmw
Enclosure

cc: Mr. J. R. Dupree (ALG-312)
Mr. L. Achitoff (AEA-4)

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Attachment A

CORRECTED COMPARISON OF EXPERIMENTS 2 AND 9

LaGuardia Airport

New York
Airport Improvement Task Force Delay Studies

Peat, Marwick, Mitchell & Co.
San Francisco, California

February 1980

LaGuardia Airport

COMPARISON OF EXPERIMENTS 2 AND 9

At the July 10, 1979, meeting of the New York Task Force, a question was raised about the comparison between the results of LGA Experiments 2 and 9 presented in Table A-1 of Data Package No. 6 as follows:

Experiment No.	Weather	Runways Used		Average Runway Delays[a]-Minutes	
		Arrivals	Departures	Arrivals	Departures
2	IFR 1	22	13	42.6	0.7
9	IFR 2	13	4	33.8	9.8

In particular, the question was, "Why are the delays to arrivals in Experiment 2 greater than in Experiment 9?"

Upon checking the computer listings, it was found that an error had been made in recording the delay values. The correct comparisons read as follows:

Experiment No.	Weather	Runways Used		Average Runway Delays[a]-Minutes	
		Arrivals	Departures	Arrivals	Departures
2	IFR 1	22	13	42.6	0.7
9	IFR 2	13	4	51.9	9.8

Thus, the value of 33.8 minutes average arrival delay for Experiment 9 in Table A-1 of Data Package No. 6 is not correct; it should read 51.9 minutes. This same correction applies to pages 17 and 31 of Data Package No. 4 and page 23 of Data Package No. 5.

---

a. Average over the 6-hour simulation period.

Attachment B

SENSITIVITY EXPERIMENTS 54 AND 55
(1978 General Aviation Traffic and ATC System)

LaGuardia Airport

New York
Airport Improvement Task Force Delay Studies

Peat, Marwick, Mitchell & Co.
San Francisco, California

February 1980

LGA STAGE-2 EXPERIMENTS

Experiment No. 54

Objective:

To provide a sensitivity test on 1982 demand with the August 1978 ATC Scenario (separations) and the 1978 level of general aviation operations in IFR1 conditions, for the following runway-use configuration:

Arrival Runway	Departure Runway
22	13

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 1-hour summaries and a short-form network.

Results:

Below is a table that shows selected results for the peak-demand hour, 1700-1800 hours, and average values over the 6-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment		Experiment 32	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow rate	a/c per hr.	29.8	30	29.0	31
Arrival	Air delay	minute	32.1	22.1	19.3	16.4
Departure	Flow rate	a/c per hr.	31.4	34.0	27.7	32
Departure	Runway delay	minute	1.0	1.2	1.0	1.1

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

FIGURE 54A AVERAGE RUNWAY FLOW RATES

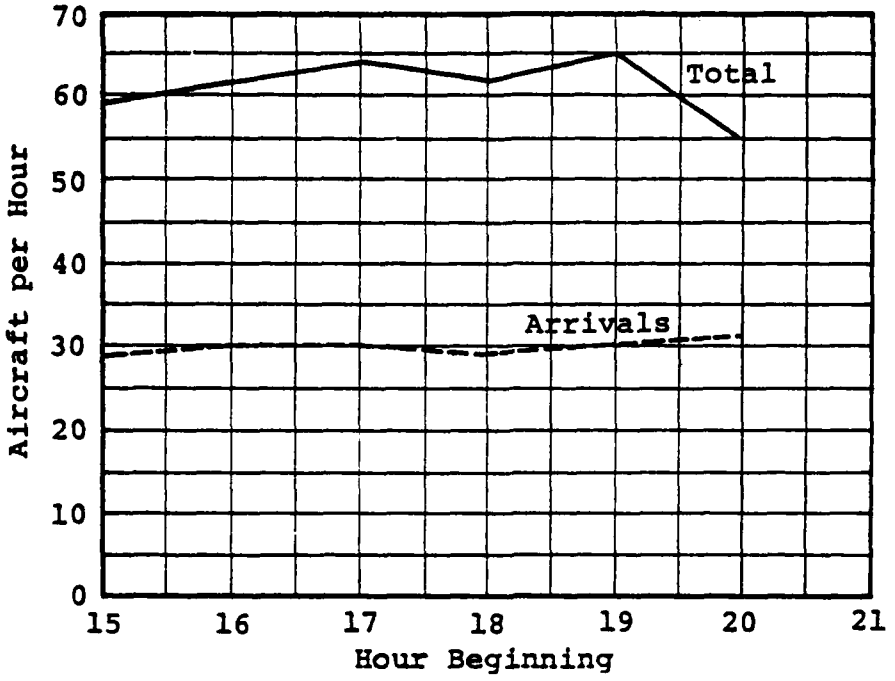
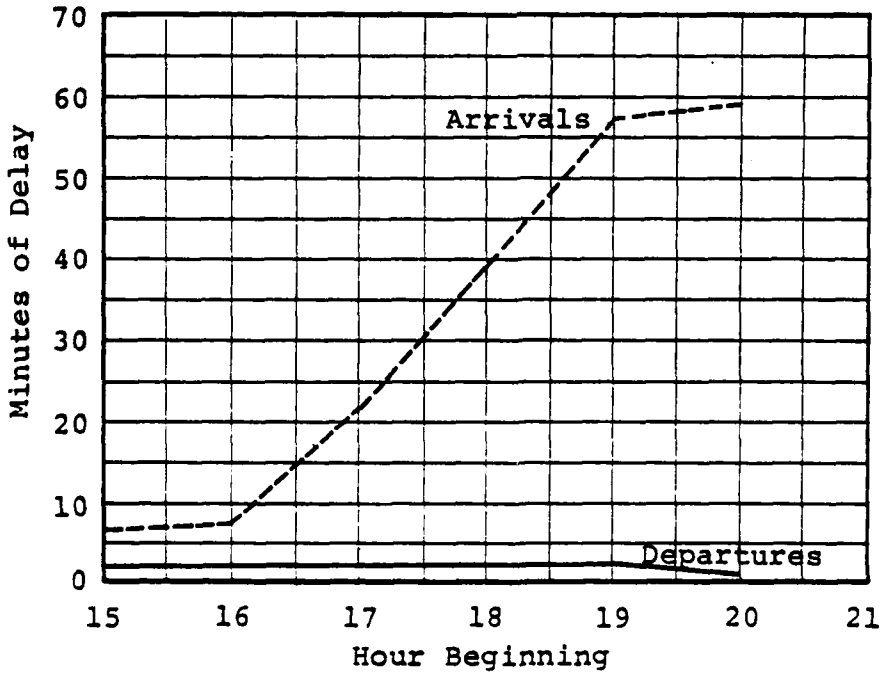


FIGURE 54B AVERAGE RUNWAY DELAYS



LGA STAGE-2 EXPERIMENTS

Experiment No. 55

Objective:

To provide a sensitivity test on 1987 demand with the 1978 ATC Scenario (separations) and the 1978 level of general aviation operations in IFR1 conditions, for the following runway-use configuration:

Arrival Runway	Departure Runway
22	13

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 1-hour summaries and a short-form network.

Results:

Below is a table that shows selected results for the peak-demand hour, 1700-1800 hours, and average values over the 6-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment		Experiment 38	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow rate	a/c per hr.	29.3	31	31.5	41
Arrival	Air delay	minute	40.6	29.8	3.0	5.2
Departure	Flow rate	a/c per hr.	31.2	36	29.3	34
Departure	Runway delay	minute	0.9	1.1	1.5	1.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

FIGURE 55A AVERAGE RUNWAY FLOW RATES

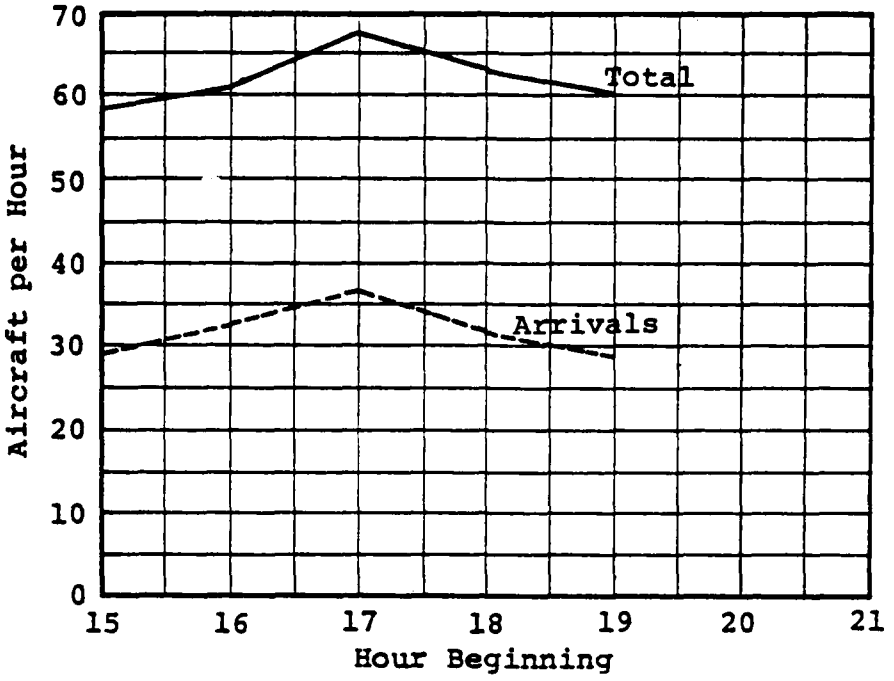
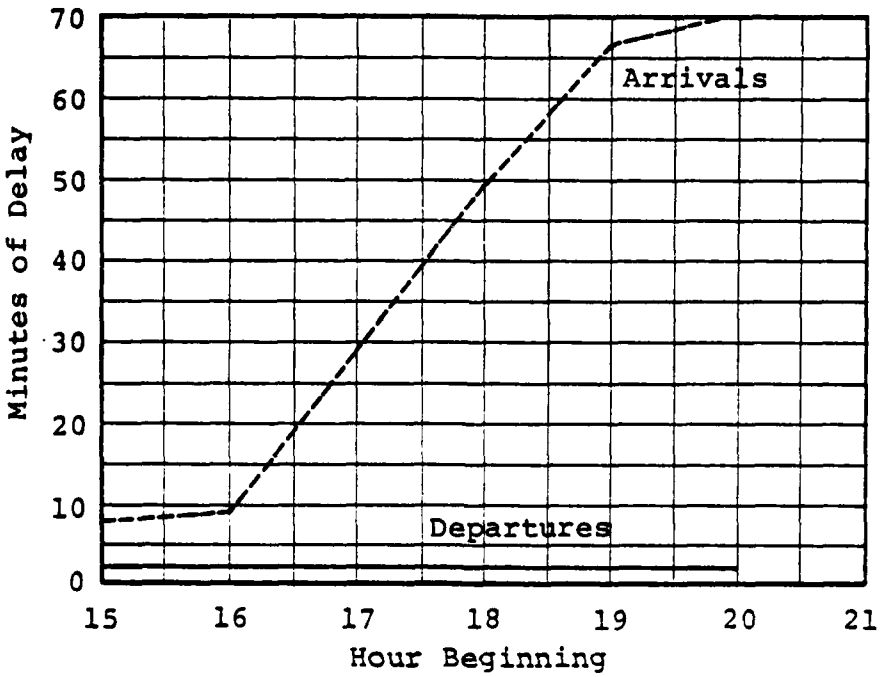


FIGURE 55B AVERAGE RUNWAY DELAYS



Summary of LGA Sensitivity Tests

Sensitivity tests have been performed to investigate the influence on delays of the following combinations of conditions for 1982 and 1987 (experiment numbers shown in parentheses):

- (48 and 49) Port Authority of New York and New Jersey (PNYNJ) demand forecasts (higher percentage of heavy aircraft and fewer total operations than the Task Force forecasts);
- (50 and 51) Maintaining 1978 general aviation (GA) traffic but with future ATC separations;
- (52 and 53) Maintaining 1978 ATC separations, but with future GA traffic; and
- (54 and 55) Maintaining both 1978 ATC separations and GA traffic.

Table B-1 is a summary of the delay results for these sensitivity tests along with the 1982 and 1987 baseline cases (Experiments 32 and 38, respectively), which involve both future GA levels and future ATC separations according to FAA Report FAA-EM-78-8A.

The air carrier schedules and GA traffic levels listed in Table B-1 are described in detail in Data Package No. 6, Attachment B, pp. 45-52. The various ATC separations are also presented in Data Package No. 6, Attachment E.

Table B-1

SUMMARY OF SENSITIVITY RESULTS
LaGuardia Airport
IFR1 Weather

Experiment number	Air carrier schedule	General aviation traffic	ATC separations	Average runway delays[a] (minutes) Arrivals	Departures
32[b]	1982 Task Force	1987 PNYNJ	1982	19.3	1.0
48	1982 PNYNJ	1982 PNYNJ	1982	18.8	0.9
50	1982 Task Force	1978	1982	20.8	1.1
52	1982 Task Force	1982 PNYNJ	1978	22.0	0.9
54	1982 Task Force	1978	1978	32.1	1.0
38[b]	1978 Task Force	1978 PNYNJ	1978	3.0	1.5
49	1987 PNYNJ	1987 PNYNJ	1987	1.1	1.1
51	1987 Task Force	1978	1987	4.4	1.6
53	1987 Task Force	1987 PNYNJ	1978	24.3	1.0
55	1987 Task Force	1978	1978	40.6	0.9

a. Average over the 6-hour simulation period.

b. Baseline cases.

Attachment C

WEST TAXIWAY EXPERIMENTS

LaGuardia Airport

New York
Airport Improvement Task Force Delay Studies

Peat, Marwick, Mitchell & Co.
San Francisco, California

February 1980

WEST TAXIWAY EXPERIMENTS

LaGuardia Airport

Scenario Description

The West Taxiway Experiments are designed to measure the effects on delay of alternative taxiway improvements on the west side of runway 4-22, especially during severe storm conditions. The storm conditions assumed for the experiments are outlined below:

Time-hours	Storm Pattern
1600	Line of thunderstorms moving into New York from the southwest
1730	Thunderstorms approaching LaGuardia Airport from the southwest
1800	Thunderstorms over LaGuardia. All traffic stops for 15 minutes.
1815	Storms are clearing LaGuardia and moving northeast
1930	Operations back to normal - queues at departure runway end are being served

The New York Task Force translated the foregoing storm pattern into specific required in-trail separations between successive departures using each of four departure fixes. These separation requirements are listed in Table C-1.

Experimental Design

Table C-2 describes the six LaGuardia West Taxiway Experiments in terms of runways used and the assumed taxiway system west of runway 4-22 in each case. The ground taxiing patterns for each experiment were defined by a special working group of the New York Task Force.

Effects of Departure Queues on Arrivals

The Task Force identified points on the taxiway system where departure queues become so long that arrivals have to be spaced farther apart than normal, say 10 or 20 miles, or stopped altogether.

Table C-1

LaGuardia West Taxiway Experiments
Restrictions to Departures

Interval Beginning	Departure fix or SID[a]				Reroutes[b]
	S.W.	SBJ	HUO	MARES	
1500	Stop[c] 60 minutes	Stop 60 minutes	Stop 60 minutes	Stop 60 minutes	Preload
1600	20 MIT[d] 8 minutes	Stop 15 minutes	20 MIT 8 minutes	10 MIT 5 minutes	
1615	Stop 15 minutes	Stop 15 minutes	20 MIT 8 minutes	10 MIT 5 minutes	
1630	Stop 15 minutes	Stop 15 minutes	Stop 15 minutes	10 MIT 5 minutes	
1645	Stop 15 minutes	Stop 15 minutes	Stop 15 minutes	20 MIT 8 minutes	
1700	Stop 15 minutes	20 MIT 8 minutes	Stop 15 minutes	20 MIT 8 minutes	
1715	20 MIT 8 minutes	20 MIT 8 minutes	Stop 15 minutes	Stop 15 minutes	50% S.W. to SBJ
1730	20 MIT 8 minutes	20MIT 8 minutes	Stop 15 minutes	Stop 15 minutes	50% S.W. to SBJ
1745	20 MIT 8 minutes	20MIT 8 minutes	Stop 15 minutes	Stop 15 minutes	
1800	Stop 15 minutes	Stop 15 minutes	Stop 15 minutes	Stop 15 minutes	
1815	20 MIT 8 minutes	20 MIT 8 minutes	20 MIT 8 minutes	Stop 15 minutes	
1830	10 MIT 5 minutes	10 MIT 5 minutes	20 MIT 8 minutes	Stop 15 minutes	50% S.W. to SBJ 50% HUO to MARES
1845	10 MIT 5 minutes	10 MIT 5 minutes	10 MIT 5 minutes	20 MIT 8 minutes	0.33 HUO to MARES
1900	6 MIT 4 minutes	6 MIT 4 minutes	6 MIT 4 minutes	20 MIT 8 minutes	
1915	5 MIT 3 minutes	5 MIT 3 minutes	5 MIT 3 minutes	10 MIT 5 minutes	
1930	None	None	None	5 MIT 3 minutes	
1945	None	None	None	None	
2000	None	None	None	None	

a. SID Stands for "Standard Instrument Departure" route. The four routes shown are: (1) S.W. = Southwest and Keansberg SID's, (2) SBJ = Solberg/Ringoes SID, (3) HUO - Sloat SID, and (4) MARES = Norwalk SID.

b. In this column, the percentage of departures that are rerouted from one fix to another is shown for each interval.

c. Stop means that no departures can be released during the interval.

d. MIT represents "miles in trail," or the required longitudinal separation between successive departures.

Table C-2

WEST TAXIWAY EXPERIMENTS
EXPERIMENTAL DESIGN
LaGuardia Airport

Experiment No.	Year	Weather[a]	Runways Used		Taxiway System
			Arrivals	Departures	
1	1978	IFR1	22	13	Existing
2	1978	IFR1	4	4	Existing
3	1978	IFR1	22	13	Phase I
4	1978	IFR1	4	4	Phase I
5	1978	IFR1	22	13	Ultimate
6	1978	IFR1	4	4	Ultimate

a. The conditions immediately preceding and following the storm.

In the Airfield Simulation Model, the foregoing phenomenon was modeled by using a multiple queue trigger/interarrival gap mechanism. The values of the queue triggers used in each experiment are listed in Table C-3.

Demand

The schedule used in the West Taxiway Experiments was based on an August 1978 OAG schedule and general aviation traffic counts from FAA PMS Summary Sheets from the LaGuardia Tower. An hourly demand count is shown in Table C-4.

Results of West Taxiway Experiments

Output Summaries. Computer printouts of the summary output for each of the six West Taxiway Experiments are presented at the end of this attachment on pages C-13 through C-18. Note that average flow rates and average delays are tabulated for each 15-minute interval from 1500 hours to 2400 hours.

Furthermore, departure flow rates and delays are presented for each departure fix. Recall that the four departure fixes are represented by four distinct departure runways that are mutually dependent upon each other, i.e., the four runways behave as one runway. The correspondence between the runway numbers and the departure fix names is shown at the bottom of each summary sheet.

A summary of the total flow rates and average delays for the entire simulation period is presented in the lower left corner of each output summary sheet.

Note that the simulation period is 1500 to 2400 hours. The demand schedule, however, as shown in Table C-4, only extends to the hour 2000. Thus, there is a four-hour recovery period in which there is no demand. This was done in an attempt to permit the congestion to dissipate within the simulation period, so that the average delay values would reflect all of the aircraft in the schedule. This attempt was largely successful; only in Experiment 2 was there a significant number of aircraft (approximately 60 arrivals) not served by 2400 hours, as will be described later.

Experiments 1, 3, and 5. The results of the three experiments for the case of arrivals on runway 22 and departures on runway 13 are shown graphically in Exhibit C-1. In that exhibit, the solid line represents cumulative demand, while the dashed lines

Table C-3

WEST TAXIWAY EXPERIMENTS
QUEUE TRIGGER INPUTS
LaGuardia Airport

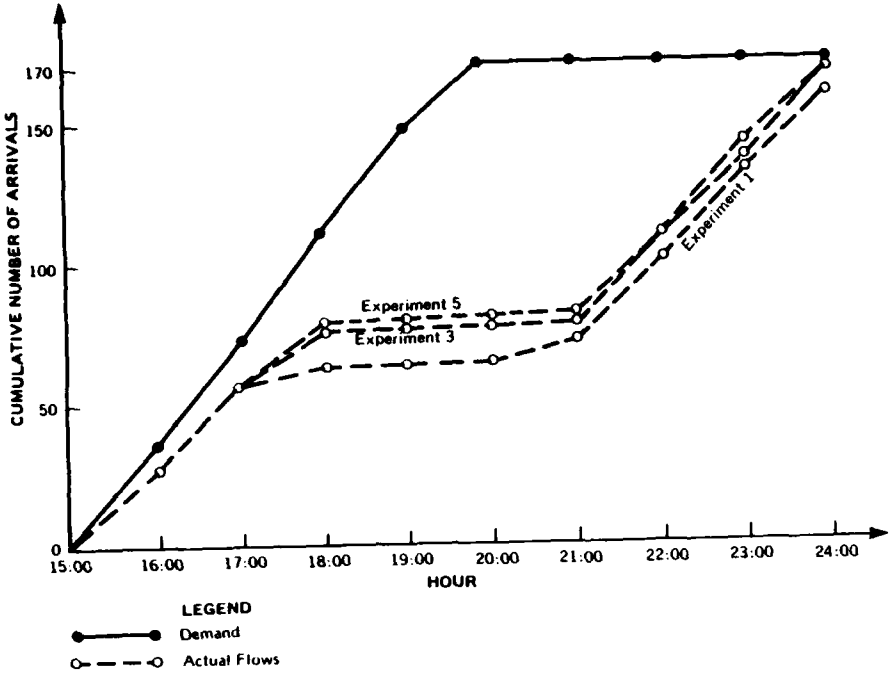
Experiment Number	Runways Used		Taxiway System	Number in departure queue to trigger interarrival gap of:		
	Arrivals	Departures		10 miles	20 miles	stop[a]
1	22	13	Existing	52	62	67
2	4	4	Existing	36	46	51
3	22	13	Phase I	63	73	78
4	4	4	Phase I	68	78	83
5	22	13	Ultimate	67	77	82
6	4	4	Ultimate	80	90	95

a. Stop means that no arrivals would be allowed to land if the departure queue exceeds the value shown.

Table C-4

WEST TAXIWAY EXPERIMENTS
DEMAND INPUTS
LaGuardia Airport

Hour beginning	Hourly aircraft demand		
	Arrivals	Departures	Total
1500	36	28	64
1600	35	37	72
1700	41	41	82
1800	34	36	70
1900	25	29	54
2000	0	0	0
Total	171	171	342



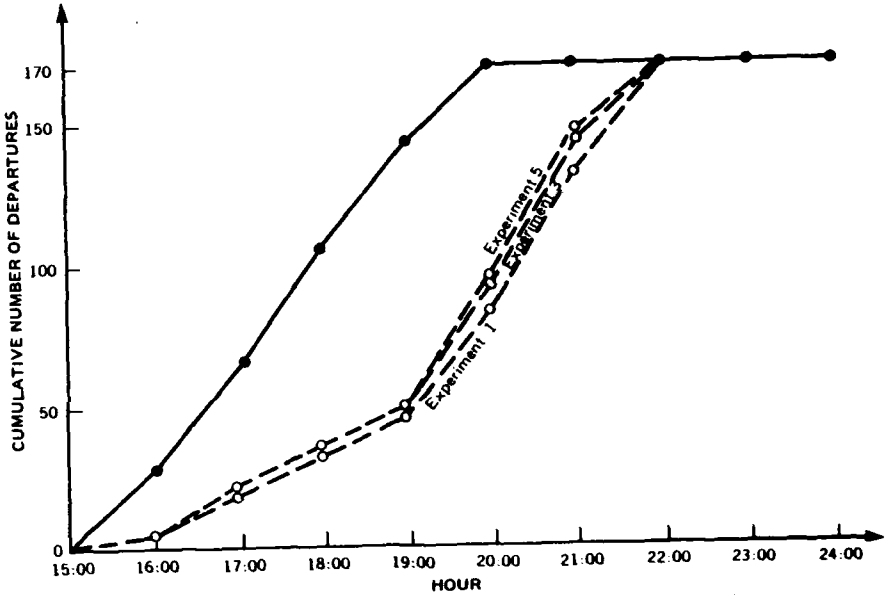


Exhibit C—1

New York Task Force
LaGuardia Airport

WEST TAXIWAY RESULTS
TASK FORCE SCENARIO
EXPERIMENTS 1, 3, AND 5

PMM&Co. February 1980

represent cumulative flow rates. Note that the demand curve becomes horizontal at the 2000 hour, indicating that there is no demand in the last four hours. The phenomenon of arrivals being shut off because of long departure queues is clearly illustrated in the left-hand portion of Exhibit C-1.

For each experiment in Exhibit C-1, the total delay to all aircraft is represented graphically by the area between the solid cumulative demand curve and the dashed cumulative flow curve. More precisely, the area between the two curves in each case is the total delay experienced by the 171 operations of each type (i.e., the demand in the interval 1500-2000 hours) within the total simulation period of 1500 hours to 2400 hours.

Average delays computed by the Airfield Simulation Model are represented graphically by the shaded bars (plotted vertically downward) of Exhibit C-2. Note that the first case at the top of the exhibit is the baseline case where no airspace constraints are present.

Also shown in Exhibit C-2 is the actual total number of arrival and departure operations accomplished in the interval 1500 hours to 2000 hours (these values correspond to the plotted values in Exhibit C-1 at the 2000 hour). It is important to realize that these values are less than the total number of operations of each type accomplished by 2400 hours, which is shown on the computer output summary sheets and is the value plotted at 2400 hours on each portion of Exhibit C-1.

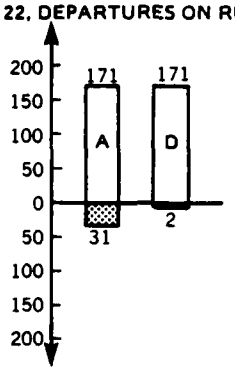
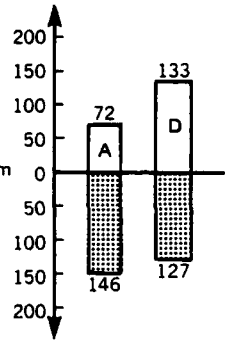
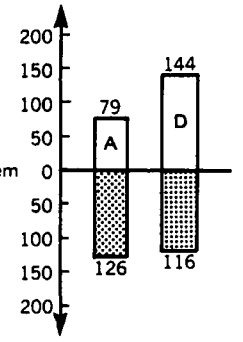
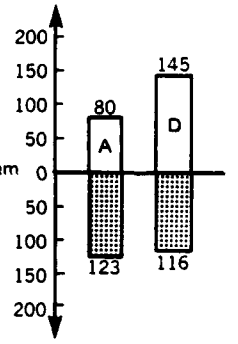
Exhibit C-2 also shows the total delay in minutes, for all 342 operations combined, and the total delay cost, assuming $20 per minute as an average aircraft operating cost.

The costs shown on Exhibit C-2 translate into the following delay savings for the Phase-I and Ultimate west taxiway systems compared with the existing system:

Experiment No.	West Taxiway System	Total Cost	Cost Savings
1	Existing	$933,000	--
3	Phase I	$828,000	$105,000
5	Ultimate	$817,700	$115,300

These savings are for the 342 aircraft operations scheduled for the 5-hour interval 1500-2000 hours.

60—MINUTE SEPARATIONS IN FIRST HOUR
ARRIVALS ON RUNWAY 22, DEPARTURES ON RUNWAY 13

CASE DESCRIPTION		TOTAL DELAY COST*
Normal Separations Throughout Simulation Period (No Airspace Constraints)		Total Delay = 5,660 minutes Total Cost = $113,200
Task Force Scenario Existing Taxiway System (Experiment 1)		Total Delay = 46,650 minutes Total Cost = $933,000
Task Force Scenario Phase—I Taxiway System (Experiment 3)		Total Delay = 41,400 minutes Total Cost = $828,000
Task Force Scenario Ultimate Taxiway System (Experiment 5)		Total Delay = 40,890 minutes Total Cost = $817,700

*Assuming $20/minute

Exhibit C—2

New York Task Force
LaGuardia Airport

WEST TAXIWAY RESULTS
TASK FORCE SCENARIO
EXPERIMENTS 1, 3, AND 5

PMM&Co. February 1980

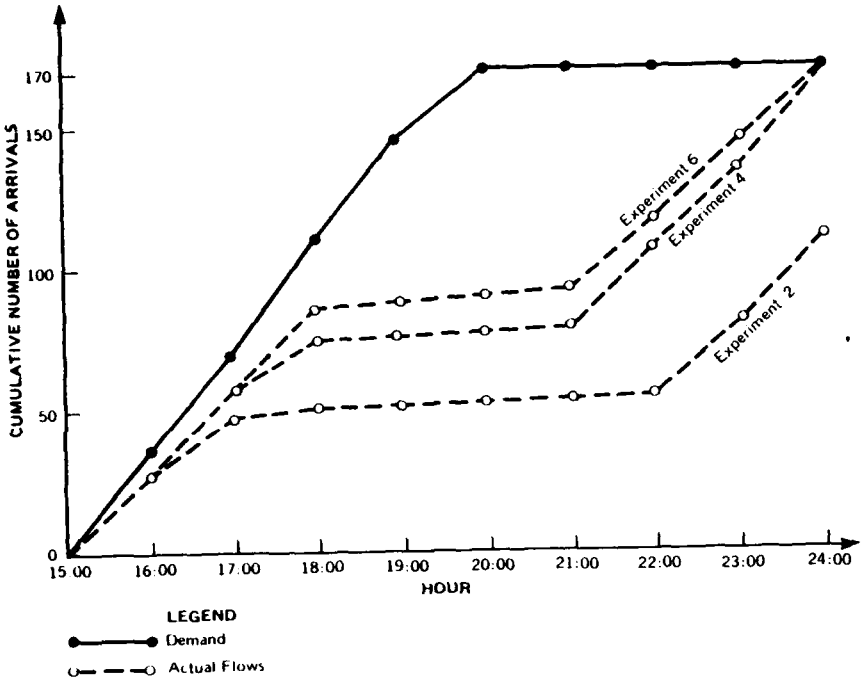
Experiments 2, 4, and 6. The demand data and actual flow rates for the case of arrivals and departures on runway 4 are plotted in Exhibit C-3. This exhibit shows that, with the existing system, approximately 40% of the arrivals scheduled in the interval 1500-2000 hours have still not landed at 2400 hours. With the Phase I system, however, nearly all arrivals are served by 2400 hours.

Exhibit C-4 shows the total flow rates in the 5-hour demand period. Note that only 54 of the 171 arrivals (less than one-third) scheduled for that period are served, and only 108 of the 171 scheduled departures (less than two-thirds) actually takeoff in the interval 1500-2000 hours.

Exhibit C-4 also shows, by the shaded bars plotted vertically downward, the average delays per aircraft for each type of operation and the total delays and delay costs for each experiment. The cost savings for the Phase I and Ultimate west taxiway systems, compared with the existing system, are tabulated below:

Experiment No.	West Taxiway System	Total Cost	Cost Savings
2	Existing	$1,166,900	--
4	Phase I	$ 885,800	$281,100
6	Ultimate	$ 796,200	$370,000

As before, these savings are for the 342 operations scheduled for the 5-hour interval 1500-2000 hours.



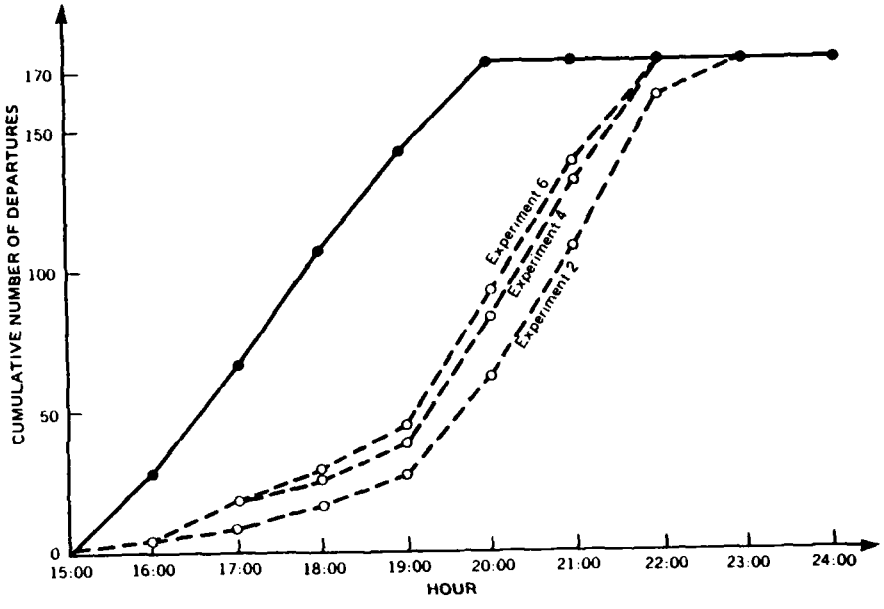


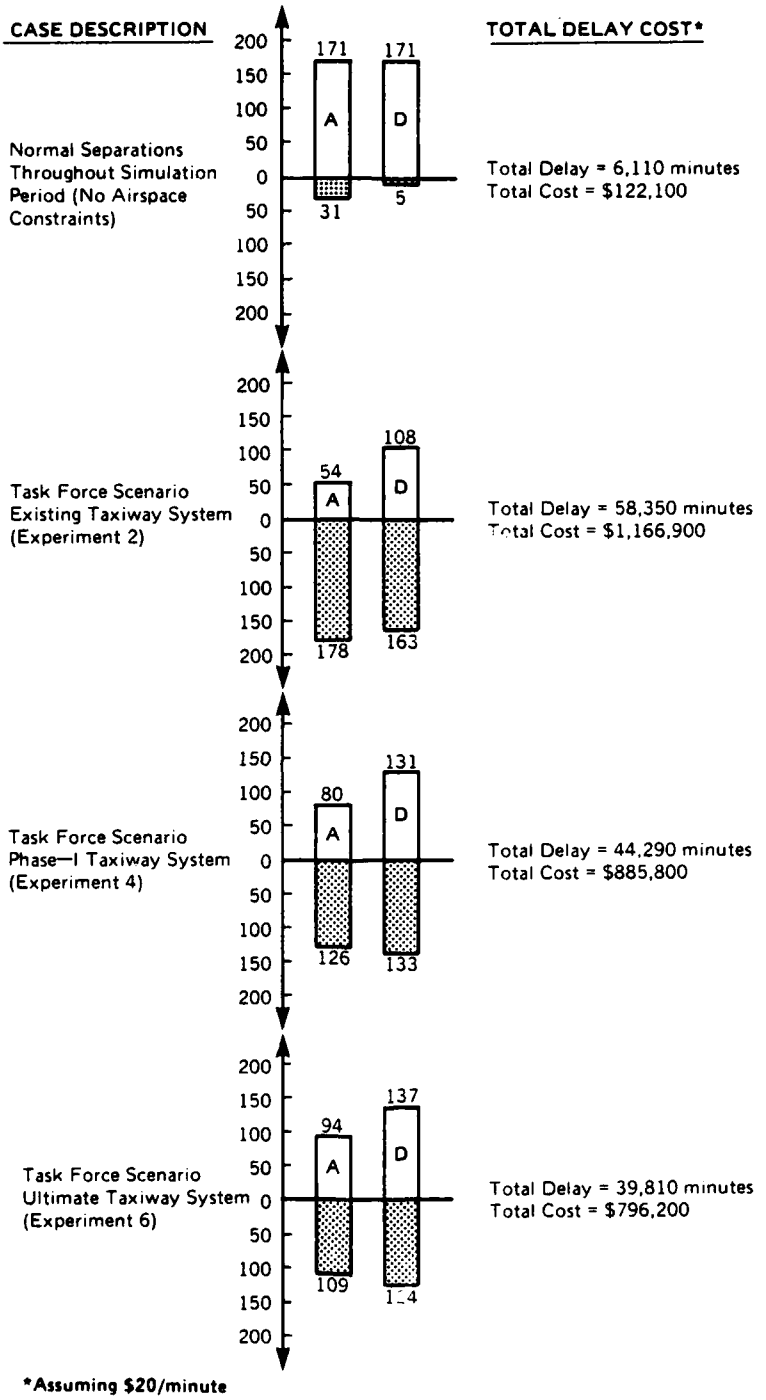
Exhibit C—3

New York Task Force
LaGuardia Airport

WEST TAXIWAY RESULTS
TASK FORCE SCENARIO
EXPERIMENTS 2, 4, AND 6

PMM&Co. February 1980

60—MINUTE SEPARATIONS IN FIRST HOUR
ARRIVALS AND DEPARTURES ON RUNWAY 4



*Assuming $20/minute

Exhibit C—4

New York Task Force
LaGuardia Airport

WEST TAXIWAY RESULTS
TASK FORCE SCENARIO
EXPERIMENTS 2, 4, AND 6

PMM&Co. February 1980

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 1
Task Force Scenario

Arrivals on Runway 22
Departures on Runway 13

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	1.00	1.00	0.00	1.00	3.00	1.53	0.78	0.00	0.20	0.84	6.70	0.95
15: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	7.98
15: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	7.09
15: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	5.85
16: 0	1.80	1.00	1.00	2.00	5.80	61.69	61.51	41.36	41.93	51.34	6.90	9.51
16: 15	0.60	0.00	2.00	1.00	3.60	45.81	0.00	52.56	54.19	56.61	7.60	6.51
16: 30	0.60	0.00	0.40	2.80	3.80	48.98	0.00	23.93	58.99	62.95	6.70	10.65
16: 45	1.00	0.00	0.70	1.20	2.90	70.10	0.00	43.63	63.59	65.51	7.20	19.41
17: 0	1.10	0.70	1.00	0.00	2.80	66.05	78.43	63.50	0.00	83.59	3.90	22.36
17: 15	1.80	0.20	1.00	0.00	3.00	95.77	24.10	74.19	0.00	90.18	2.90	32.90
17: 30	1.00	1.00	0.90	1.00	3.90	63.48	64.20	79.58	84.53	96.52	0.70	15.54
17: 45	1.30	1.10	1.00	1.00	4.40	94.66	103.49	93.47	90.18	105.33	0.00	0.00
18: 0	1.20	0.60	1.00	0.00	2.80	90.00	48.76	101.52	0.00	117.06	0.00	0.00
18: 15	0.30	0.30	0.40	0.10	1.10	42.36	42.28	49.83	12.09	134.28	0.00	0.00
18: 30	0.90	1.60	0.90	0.10	3.50	74.70	153.53	115.42	12.27	144.61	0.00	0.00
18: 45	2.00	2.20	0.80	0.70	5.70	119.07	162.91	110.16	87.10	153.11	0.00	0.00
19: 0	3.20	0.30	0.90	1.70	6.10	146.73	35.31	105.84	155.99	151.92	1.10	120.77
19: 15	3.90	1.40	1.30	2.50	9.10	142.03	148.54	156.18	164.94	149.10	0.10	13.45
19: 30	3.10	1.00	1.40	3.80	9.30	108.73	51.15	73.42	152.66	127.67	0.00	0.00
19: 45	3.10	1.90	4.10	3.20	12.30	100.62	141.65	133.07	137.27	128.36	0.00	0.00
20: 0	5.20	3.20	3.30	1.20	12.90	119.24	132.02	136.70	141.30	138.39	0.00	0.00
20: 15	3.50	2.50	5.10	1.60	12.70	108.88	105.04	140.27	96.66	130.69	0.00	0.00
20: 30	2.10	1.90	4.50	3.50	12.00	71.65	128.74	119.78	115.58	123.12	0.40	69.19
20: 45	4.70	0.90	2.80	3.60	12.00	80.30	86.62	93.62	104.77	110.43	6.50	234.89
21: 0	5.80	0.10	2.80	3.10	11.80	125.79	24.19	109.19	102.69	117.24	7.40	232.30
21: 15	2.70	3.90	2.70	3.00	12.30	194.77	195.89	169.87	135.71	182.92	7.50	237.10
21: 30	0.70	7.70	2.00	1.50	11.90	140.03	169.74	224.62	174.33	183.09	7.40	242.59
21: 45	0.40	1.50	0.00	0.40	2.30	95.66	164.95	0.00	97.87	166.44	7.30	247.73
22: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.10	249.62
22: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.20	253.46
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	260.62
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	255.69
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.90	232.97
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	246.35
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.10	217.21
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.70	176.39

TOTAL ARRIVALS = 160.70
TOTAL DEPARTURES = 171.00
AVG. ARRIVAL DELAY = 145.76
AVG. DEPARTURE DELAY = 127.05

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 2
Task Force Scenario

Arrivals and Departures on Runway 4

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	1.00	1.00	0.00	1.00	3.00	2.44	0.00	0.00	1.22	1.22	6.60	0.97
15: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	7.78
15: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	6.94
15: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	5.62
16: 0	1.00	1.00	0.00	0.00	2.00	60.92	60.29	0.00	0.00	60.61	6.60	9.39
16: 15	1.00	0.00	0.00	0.00	1.00	71.86	0.00	0.00	0.00	71.86	3.20	14.50
16: 30	1.00	0.00	0.00	0.00	1.00	85.40	0.00	0.00	0.00	85.40	3.90	15.44
16: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.30	26.76
17: 0	0.00	1.00	0.70	1.10	2.80	0.00	109.62	74.81	104.60	107.05	2.70	32.43
17: 15	0.00	0.00	1.40	0.90	2.30	0.00	0.00	112.28	101.57	112.40	0.20	5.31
17: 30	1.00	0.00	0.90	1.00	2.90	121.45	0.00	105.44	121.58	120.03	0.00	0.00
17: 45	1.00	0.00	0.00	1.00	2.00	127.80	0.00	0.00	132.18	129.99	0.00	0.00
18: 0	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	147.60	147.60	0.00	0.00
18: 15	1.00	0.00	0.00	1.00	2.00	159.20	0.00	0.00	165.20	162.20	0.00	0.00
18: 30	1.10	0.10	1.00	1.00	3.20	172.11	17.35	173.42	170.41	172.13	0.90	105.83
18: 45	2.80	1.00	0.50	0.00	4.30	176.51	178.23	88.50	0.00	177.15	0.30	26.29
19: 0	1.10	2.00	1.50	0.00	4.60	186.87	182.63	181.22	0.00	183.13	0.10	15.31
19: 15	1.10	3.90	1.10	1.00	7.10	196.15	194.75	195.85	195.18	195.14	0.00	0.00
19: 30	2.60	1.40	3.90	3.20	11.10	163.05	101.12	170.85	167.83	159.15	0.00	0.00
19: 45	3.30	1.30	4.30	3.60	12.50	111.16	70.22	158.07	171.07	139.75	0.00	0.00
20: 0	3.00	1.30	1.50	5.60	11.40	199.49	181.38	137.44	191.80	183.60	0.00	0.00
20: 15	4.20	5.00	2.20	0.60	12.00	157.19	172.27	149.28	117.17	163.97	0.90	207.46
20: 30	3.50	2.00	4.00	2.70	12.20	133.92	139.37	136.08	133.26	134.98	0.00	0.00
20: 45	3.10	2.20	3.30	3.00	11.60	110.66	108.95	111.46	111.35	110.95	0.10	25.11
21: 0	4.10	1.80	2.20	2.80	10.90	118.23	132.62	146.55	124.91	128.08	0.00	0.00
21: 15	4.50	5.00	1.20	1.90	12.60	194.14	207.90	185.04	132.73	190.72	0.00	0.00
21: 30	2.70	1.90	3.80	3.60	12.00	195.32	182.39	209.41	153.72	186.04	0.00	0.00
21: 45	4.90	0.10	4.40	2.00	11.40	171.87	13.33	205.52	198.13	188.90	0.00	0.00
22: 0	3.00	4.00	3.40	1.70	12.10	262.68	266.48	264.71	267.28	265.10	5.90	296.50
22: 15	1.00	0.00	0.70	0.30	2.00	270.33	0.00	159.09	79.49	268.12	7.30	332.73
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	334.04
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.20	334.93
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	339.94
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	344.51
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	315.89
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.10	306.86

TOTAL ARRIVALS = 111.10
TOTAL DEPARTURES = 171.00
AVG. ARRIVAL DELAY = 178.11
AVG. DEPARTURE DELAY = 163.07

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 3
Task Force Scenario

Arrivals on Runway 22
Departures on Runway 13

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	1.00	1.00	0.00	1.00	3.00	1.06	0.00	0.00	1.44	0.84	6.60	0.95
15: 15	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.01	0.00	0.01	7.40	7.83
15: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	6.74
15: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	5.95
16: 0	1.40	1.00	0.00	2.00	4.40	60.82	60.54	0.00	43.89	52.95	7.00	9.65
16: 15	0.60	0.00	1.00	3.00	4.60	43.62	0.00	55.40	44.46	50.31	7.10	7.51
16: 30	1.10	0.00	1.00	3.00	5.10	82.36	0.00	66.28	25.02	45.23	6.90	10.93
16: 45	0.90	0.00	1.00	1.10	3.00	65.74	0.00	71.56	32.05	57.86	7.20	19.90
17: 0	0.90	1.00	1.00	0.30	3.20	59.98	84.73	51.14	7.70	75.77	7.30	22.52
17: 15	0.90	1.00	0.90	0.20	3.00	57.45	62.06	59.03	0.77	76.98	7.70	26.08
17: 30	0.90	0.80	0.80	0.20	2.70	88.29	69.98	57.20	3.28	90.46	5.40	24.71
17: 45	1.20	1.10	0.90	0.70	3.90	96.75	87.05	61.37	15.90	83.15	0.00	0.00
18: 0	0.80	1.00	0.80	0.60	3.20	66.88	66.47	51.16	17.13	83.71	0.00	0.00
18: 15	0.40	0.40	0.20	0.40	1.40	54.41	39.20	13.40	19.79	94.05	0.00	0.00
18: 30	0.60	0.70	0.90	0.10	2.30	88.42	56.32	63.31	3.60	94.84	0.00	0.00
18: 45	2.90	2.50	0.30	1.00	6.70	135.69	88.17	14.49	28.97	99.91	0.00	0.00
19: 0	3.30	3.30	2.00	0.70	9.30	111.93	100.20	59.90	78.81	102.96	0.00	0.00
19: 15	3.70	3.00	3.40	2.20	12.30	81.98	157.60	129.83	147.26	126.54	1.00	121.24
19: 30	4.40	2.70	3.30	2.40	12.80	174.97	120.55	173.70	185.56	163.29	0.00	0.00
19: 45	4.60	2.80	3.70	1.70	12.80	122.49	114.26	128.72	169.53	131.51	0.00	0.00
20: 0	5.00	2.00	3.90	1.40	12.30	90.36	56.70	105.91	157.53	107.31	0.00	0.00
20: 15	3.00	2.00	2.60	4.70	12.30	80.73	60.52	65.89	143.82	104.84	0.00	0.00
20: 30	2.90	3.60	3.30	2.90	12.70	101.63	107.37	84.49	96.63	101.46	0.00	0.00
20: 45	2.30	3.30	2.90	3.70	12.20	101.43	186.44	154.43	99.11	143.35	1.80	175.74
21: 0	1.80	2.30	5.50	2.70	12.30	107.46	207.75	200.20	101.01	174.89	7.40	222.55
21: 15	5.60	0.50	1.50	3.80	11.40	189.02	64.95	94.88	155.17	182.12	7.50	228.01
21: 30	2.80	0.00	0.10	0.20	3.10	134.31	0.00	21.96	22.87	165.14	7.50	233.17
21: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	234.69
22: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.70	238.48
22: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.80	245.91
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	239.23
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	208.83
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	222.48
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.20	231.00
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.90	196.31
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.60	169.37

TOTAL ARRIVALS = 168.30
TOTAL DEPARTURES = 171.00
AVG. ARRIVAL DELAY = 126.04
AVG. DEPARTURE DELAY = 116.09

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 4
Task Force Scenario

Arrivals and Departures on Runway 4

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	1.00	1.00	0.00	1.00	3.00	1.16	0.00	0.00	1.30	0.82	6.90	0.94
15: 15	0.00	0.00	0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.00	7.10	7.61
15: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	6.54
15: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.50	5.55
16: 0	1.00	0.50	0.50	2.00	4.00	60.43	30.17	19.02	43.51	49.16	6.90	9.27
16: 15	1.00	0.00	0.10	3.00	4.10	72.13	0.00	5.67	44.24	51.34	7.80	5.70
16: 30	1.00	0.00	0.10	2.70	3.80	85.67	0.00	6.77	45.82	56.90	6.70	10.24
16: 45	1.00	0.00	0.00	0.40	1.40	75.14	0.00	0.00	14.76	67.59	7.30	19.16
17: 0	0.10	0.90	1.00	0.30	2.30	9.20	77.45	76.73	13.49	95.55	7.10	20.95
17: 15	0.50	0.60	0.70	0.30	2.10	40.54	71.02	63.01	16.40	103.46	8.10	24.72
17: 30	0.80	0.50	0.50	0.30	2.10	78.91	59.38	58.08	20.90	112.88	3.80	22.02
17: 45	0.90	0.40	0.60	0.50	2.40	85.87	46.03	58.34	40.20	113.79	0.10	2.37
18: 0	0.30	0.70	1.00	0.70	2.70	26.93	78.61	104.95	65.86	121.46	0.00	0.00
18: 15	0.50	0.10	0.40	1.00	2.00	78.51	14.22	61.45	111.20	132.69	0.00	0.00
18: 30	0.40	0.60	0.60	1.00	2.60	50.18	77.54	94.44	125.87	144.93	0.00	0.00
18: 45	1.70	1.20	1.20	1.00	5.10	157.53	134.95	131.01	123.39	162.81	0.00	0.00
19: 0	3.60	1.70	1.60	1.60	8.50	176.14	159.94	152.99	131.10	169.98	0.30	35.34
19: 15	3.40	2.30	1.90	2.40	10.00	166.28	177.95	159.16	153.76	166.08	0.70	83.90
19: 30	3.70	3.10	4.10	1.70	12.60	153.02	164.96	167.23	110.47	155.22	0.00	0.00
19: 45	3.60	3.90	3.40	1.90	12.80	132.98	151.67	122.62	103.23	134.52	0.00	0.00
20: 0	3.40	2.90	3.70	2.40	12.40	114.59	121.52	127.06	105.93	139.05	0.00	0.00
20: 15	0.90	3.30	6.20	1.80	12.20	80.10	117.73	155.52	86.64	146.18	0.00	0.00
20: 30	3.70	2.00	4.10	2.40	12.20	171.76	78.96	141.71	111.83	137.21	0.00	0.00
20: 45	4.10	3.00	3.00	2.70	12.80	162.83	94.67	129.55	102.00	128.45	3.00	195.95
21: 0	4.40	2.50	2.70	3.30	12.90	142.67	143.72	110.88	93.49	131.49	7.00	222.07
21: 15	4.30	3.90	2.00	2.40	12.60	131.06	187.20	124.39	103.28	148.93	7.20	227.60
21: 30	6.10	0.90	2.40	2.00	11.40	142.39	68.95	114.89	125.81	145.03	7.70	232.48
21: 45	1.60	0.00	0.10	1.20	2.90	86.92	0.00	23.43	83.92	121.96	7.30	234.54
22: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	237.99
22: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	245.27
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.90	240.99
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.50	211.75
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	224.81
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.20	237.51
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	177.57
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	167.40

TOTAL ARRIVALS = 169.50
TOTAL DEPARTURES = 171.00
AVG. ARRIVAL DELAY = 125.87
AVG. DEPARTURE DELAY = 133.08

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 5
Task Force Scenario
Arrivals on Runway 22
Departures on Runway 13

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	1.00	1.00	0.00	1.00	3.00	1.88	0.74	0.00	0.20	0.94	6.80	0.93
15: 15	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.02	0.00	0.02	7.20	7.69
15: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.50	6.60
15: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	5.77
16: 0	1.00	1.00	0.00	2.10	4.10	61.09	61.44	0.00	42.17	51.52	7.00	9.26
16: 15	1.00	0.00	1.00	2.90	4.90	72.96	0.00	56.33	42.88	51.79	7.50	6.39
16: 30	1.00	0.00	1.00	3.00	5.00	86.29	0.00	67.29	23.60	44.88	6.70	10.40
16: 45	1.00	0.00	1.00	1.00	3.00	75.95	0.00	72.70	14.16	54.27	7.50	19.13
17: 0	0.10	1.10	0.90	0.00	2.10	9.36	108.96	47.00	0.00	83.41	7.40	20.69
17: 15	0.80	1.00	0.50	0.00	2.30	79.87	78.96	31.72	0.00	86.61	8.00	24.54
17: 30	0.90	1.10	1.00	0.60	3.60	76.44	71.85	54.58	9.18	75.59	6.70	21.74
17: 45	1.40	1.10	0.90	0.80	4.20	113.51	91.97	44.70	19.92	82.71	0.30	7.12
18: 0	1.20	0.60	1.00	0.70	3.50	134.34	45.07	40.32	12.60	75.75	0.00	0.00
18: 15	0.70	0.20	0.00	0.70	1.60	104.77	20.29	0.00	17.94	89.17	0.00	0.00
18: 30	0.80	0.80	0.50	0.50	2.60	88.29	66.11	27.00	19.99	83.35	0.00	0.00
18: 45	2.50	2.50	0.80	0.40	6.20	133.58	77.31	40.64	37.33	96.67	0.00	0.00
19: 0	3.50	3.10	1.90	1.00	9.50	101.84	81.23	58.64	123.45	94.09	0.00	0.00
19: 15	3.60	3.30	3.60	1.90	12.40	105.23	178.21	163.99	187.21	152.28	1.00	121.05
19: 30	4.50	2.30	3.80	2.20	12.80	165.58	105.65	161.72	185.63	152.87	0.00	0.00
19: 45	4.20	3.00	3.50	1.90	12.60	128.47	90.37	123.65	167.51	125.38	0.00	0.00
20: 0	5.10	0.70	4.10	2.30	12.20	91.73	48.90	100.20	169.20	110.95	0.00	0.00
20: 15	2.[illegible]	2.80	2.30	5.00	12.30	69.01	65.21	84.18	131.83	100.22	0.00	0.00
20: 30	3.1	3.90	2.40	3.50	12.90	110.14	153.56	85.76	83.00	114.23	0.00	0.00
20: 45	1.70	3.20	4.90	2.90	12.70	108.01	184.21	157.48	78.06	149.41	0.40	86.82
21: 0	2.70	1.70	3.70	3.50	11.60	122.81	142.99	161.26	114.90	158.12	6.50	221.94
21: 15	6.20	1.60	1.80	1.90	11.50	164.52	171.82	104.05	143.18	180.64	7.20	227.52
21: 30	2.80	0.00	0.40	0.20	3.40	183.74	0.00	40.06	22.93	181.05	7.40	232.53
21: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	234.28
22: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.10	238.13
22: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	245.52
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.90	234.54
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	205.29
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	218.88
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	231.79
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.80	202.79
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	193.68

TOTAL ARRIVALS = 169.10
TOTAL DEPARTURES = 171.00
AVG. ARRIVAL DELAY = 123.14
AVG. DEPARTURE DELAY = 116.70

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 6
Task Force Scenario

Arrivals and Departures on Runway 4

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	1.00	1.00	0.00	1.00	3.00	1.49	0.00	0.00	0.20	0.56	6.60	0.88
15: 15	0.00	0.00	0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.00	7.40	7.65
15: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	6.42
15: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	5.28
16: 0	1.00	0.70	0.30	2.00	4.00	60.76	42.43	11.74	42.24	49.85	6.80	9.14
16: 15	1.00	0.00	0.10	3.00	4.10	72.03	0.00	5.63	42.96	50.34	7.60	5.88
16: 30	1.00	0.00	0.10	3.00	4.10	85.59	0.00	6.56	42.97	53.86	6.80	10.30
16: 45	1.00	0.00	0.00	2.00	3.00	75.05	0.00	0.00	30.47	45.33	7.60	19.13
17: 0	0.10	0.50	0.50	1.30	2.40	8.53	54.75	45.50	36.83	66.15	7.20	20.37
17: 15	0.60	0.80	0.70	1.00	3.10	47.32	78.07	48.49	49.50	86.10	7.80	24.54
17: 30	0.70	0.60	0.80	0.80	2.90	77.20	65.35	80.78	51.18	99.99	7.20	22.04
17: 45	0.90	0.50	0.70	1.00	3.10	88.56	56.15	84.32	76.54	106.63	7.20	27.23
18: 0	0.80	0.90	0.40	1.00	3.10	97.13	90.55	51.57	82.92	116.38	2.40	28.16
18: 15	0.20	0.30	0.40	0.90	1.80	30.33	45.08	64.08	87.59	125.82	0.50	3.69
18: 30	0.60	0.30	0.30	1.00	2.20	99.37	45.23	46.09	106.67	135.12	0.00	0.00
18: 45	2.50	1.00	1.70	1.30	6.50	153.62	116.15	149.62	121.80	157.48	0.00	0.00
19: 0	3.10	1.90	1.60	1.90	8.50	169.29	173.19	156.78	108.01	156.70	0.00	0.00
19: 15	4.50	1.80	2.70	1.20	10.20	157.89	154.10	155.78	76.81	157.06	0.00	0.00
19: 30	4.00	3.40	4.70	0.60	12.70	147.04	167.96	161.27	35.22	155.07	0.90	116.44
19: 45	1.60	4.50	4.30	2.30	12.70	75.80	151.83	144.48	89.97	133.80	0.00	0.00
20: 0	0.40	4.80	4.40	3.00	12.60	30.81	143.51	133.33	75.57	123.96	0.60	13.43
20: 15	1.00	4.60	6.00	0.50	12.10	101.00	121.17	134.82	36.05	137.86	0.80	13.62
20: 30	4.30	1.70	3.00	3.00	12.00	151.68	111.68	118.56	57.84	120.66	0.70	14.33
20: 45	5.20	3.10	3.40	1.00	12.70	162.71	110.00	122.42	44.21	133.11	0.80	14.82
21: 0	5.20	2.10	4.10	1.00	12.40	153.50	85.93	106.89	57.33	129.51	0.90	14.29
21: 15	7.60	1.30	1.30	2.00	12.20	116.12	80.63	69.37	110.49	117.25	5.30	219.44
21: 30	4.40	0.20	0.40	4.20	9.20	157.55	12.45	24.35	138.52	163.68	7.70	223.69
21: 45	0.30	0.00	0.00	0.00	0.30	17.29	0.00	0.00	0.00	17.29	7.50	221.88
22: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	225.18
22: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.90	229.70
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.30	204.14
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.70	168.05
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.90	180.78
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.40	193.63
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.10	206.00
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	210.33

TOTAL ARRIVALS = 170.00
TOTAL DEPARTURES = 171.00
AVG. ARRIVAL DELAY = 108.67
AVG. DEPARTURE DELAY = 124.06

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

Attachment D

SENSITIVITY TESTS OF WEST TAXIWAY SCENARIO

LaGuardia Airport

New York

Airport Improvement Task Force Delay Studies

Peat, Marwick, Mitchell & Co.
San Francisco, California

February 1980

LaGuardia Airport
SENSITIVITY TESTS OF
WEST TAXIWAY SCENARIO

The storm described in Attachment C imposes extremely high delays to both arrivals and departures. The original west taxiway scenario, reported in Data Package No. 7, resulted in a level of congestion that was considered by the Task Force to be an insufficient test of the west taxiway improvements.

This section presents the results of several experiements with departure restrictions whose severity falls in between the two foregoing situations.

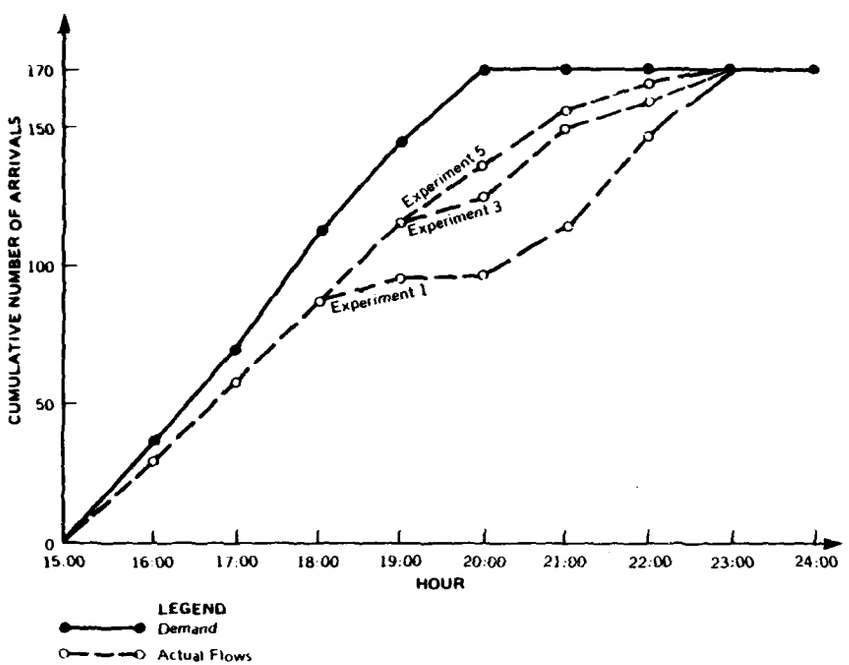
The sensitivity cases of this attachment differ from the scenario described in Attachment C in the first hour only. For example, the sensitivity case that is be described in greatest detail in this attachment involves normal (unconstrained) IFR1 departure-departure separations in the first hour; the remainder of the scenario is identical to the one in Attachment C. Other sensitivity tests reported herein involve 10-minute and 20-minute departure-departure separations in the first hour.

Normal IFR1 First Hour Departure Operations

The six West Taxiway Experiments were run with normal IFR1 departure-departure separations in the first hour, and the Task Force scenario for the remaining hours. Computer generated summary output sheets for these six experiments are presented at the end of this attachment. A summary of the results is presented below.

Experiments 1, 3, and 5. The results of the west taxiway experiments with the "modified scenario," as described above, are presented graphically in Exhibits D-1 and D-2.

In Exhibit D-1, note that all of the arrivals are now served by the 2400 hour. The costs shown in Exhibit D-2 translate into the following cost savings compared with the existing system:



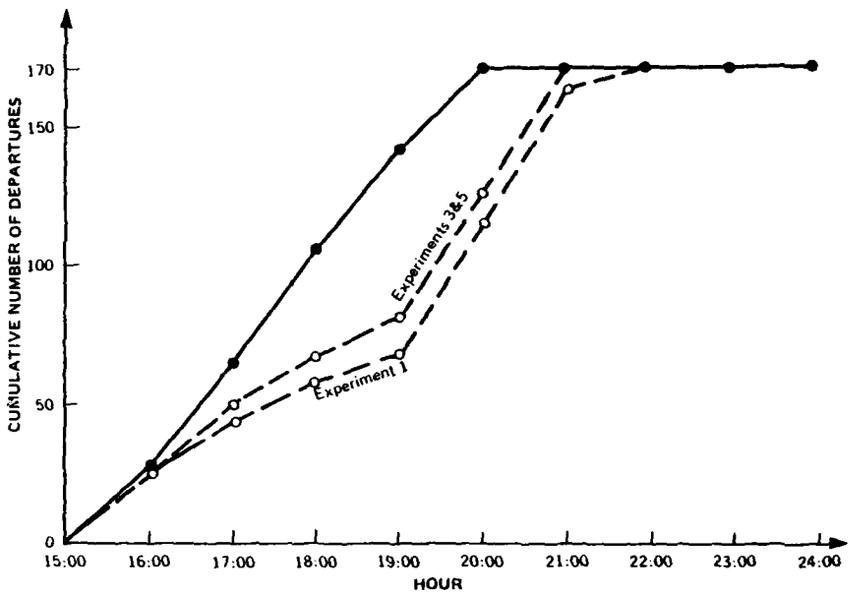


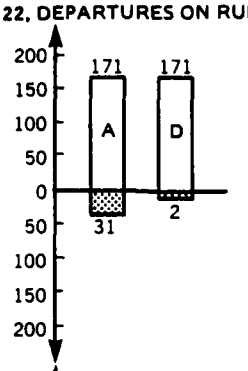
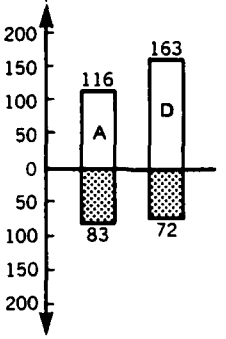
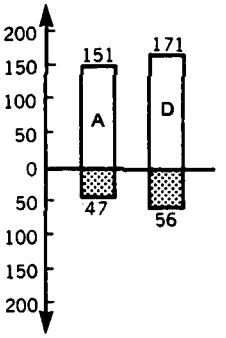
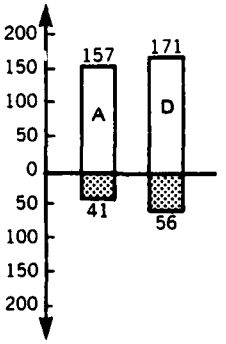
Exhibit D–1

New York Task Force
LaGuardia Airport

WEST TAXIWAY RESULTS
MODIFIED SCENARIO
EXPERIMENTS 1, 3, AND 5

PMM&Co. February 1980

NORMAL SEPARATIONS IN FIRST HOUR
ARRIVALS ON RUNWAY 22, DEPARTURES ON RUNWAY 13

CASE DESCRIPTION		TOTAL DELAY COST*
Normal Separations Throughout Simulation Period (No Airspace Constraints)		Total Delay = 5,660 minutes Total Cost = $113,200
Modified Scenario Existing Taxiway System (Experiment 1)		Total Delay = 26,470 minutes Total Cost = $529,400
Modified Scenario Phase—I Taxiway System (Experiment 3)		Total Delay = 17,590 minutes Total Cost = $351,900
Modified Scenario Ultimate Taxiway System (Experiment 5)		Total Delay = 16,590 minutes Total Cost = $331,700

*Assuming $20/minute

Exhibit D—2

New York Task Force
LaGuardia Airport

WEST TAXIWAY RESULTS
MODIFIED SCENARIO
EXPERIMENTS 1, 3, AND 5

PMM&Co. February 1980

Experiment No.	West Taxiway System	Total Cost	Cost Savings
1	Existing	$529,400	--
3	Phase I	$351,900	$177,500
5	Ultimate	$331,700	$197,700

Experiments 2, 4, and 6. Experiments 2, 4, and 6 involve arrivals and departures on runway 4. The demand versus actual flow rate comparisons for this case are shown in Exhibit D-3. Note that all of the arrivals in Experiment 2 are still not served by the 2400 hour; only 156 of the 171 arrivals scheduled for the period 1500-2000 hours actually land by the 2400 hour.

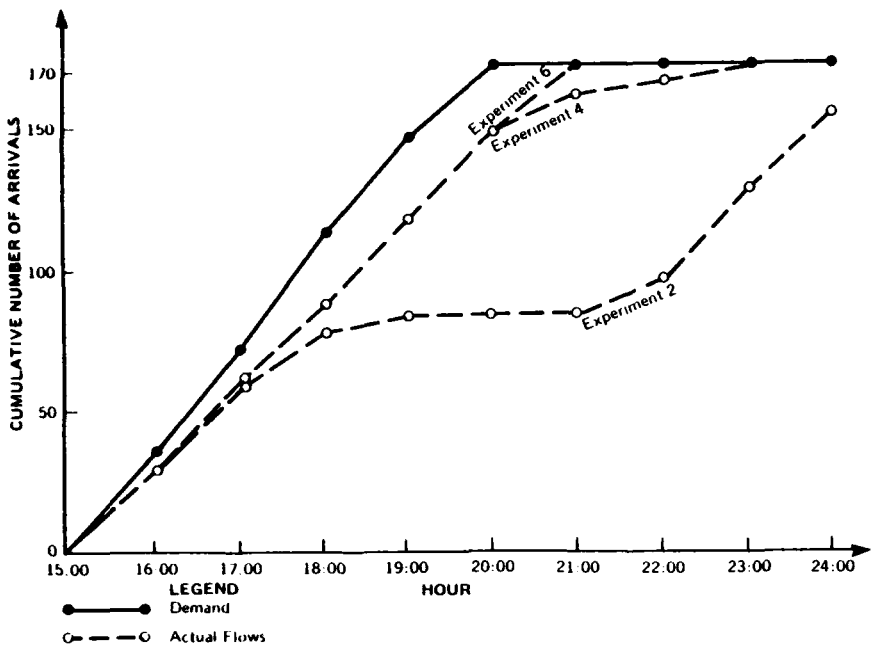
Exhibit D-4 shows the 5-hour flow rates, the average delays per operation of each type, and total delays and delay costs for each experiment. The cost savings associated with each west taxiway improvement, relative to the existing system, are summarized below:

Experiment No.	West Taxiway System	Total Cost	Cost Savings
2	Existing	$752,400	--
4	Phase I	$301,000	$451,400
6	Ultimate	$277,000	$475,400

Other First-Hour Departure Congestion Cases

Sensitivity tests were also performed with 10-minute and 20-minute first-hour departure-departure separations. For Experiments 1, 3, and 5, the resulting total flow rates and average delays are summarized in Tables D-1 and D-2, respectively. Also shown in those tables are the results for the normal IFR1 first-hour separations (the modified scenario) and the 60 minute first-hour separations (the Task Force scenario).

Similar results are described for Experiments 2, 4, and 6 in Tables D-3 and D-4.



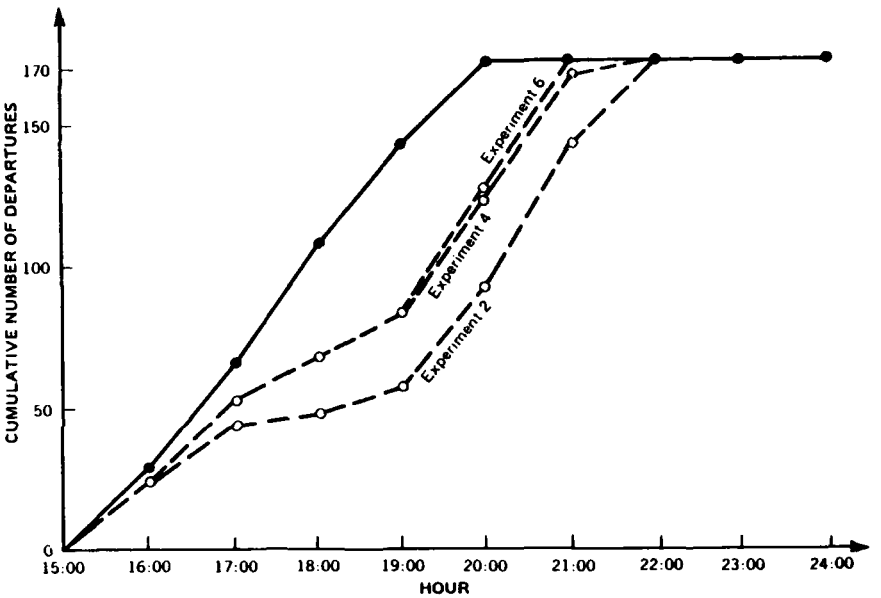


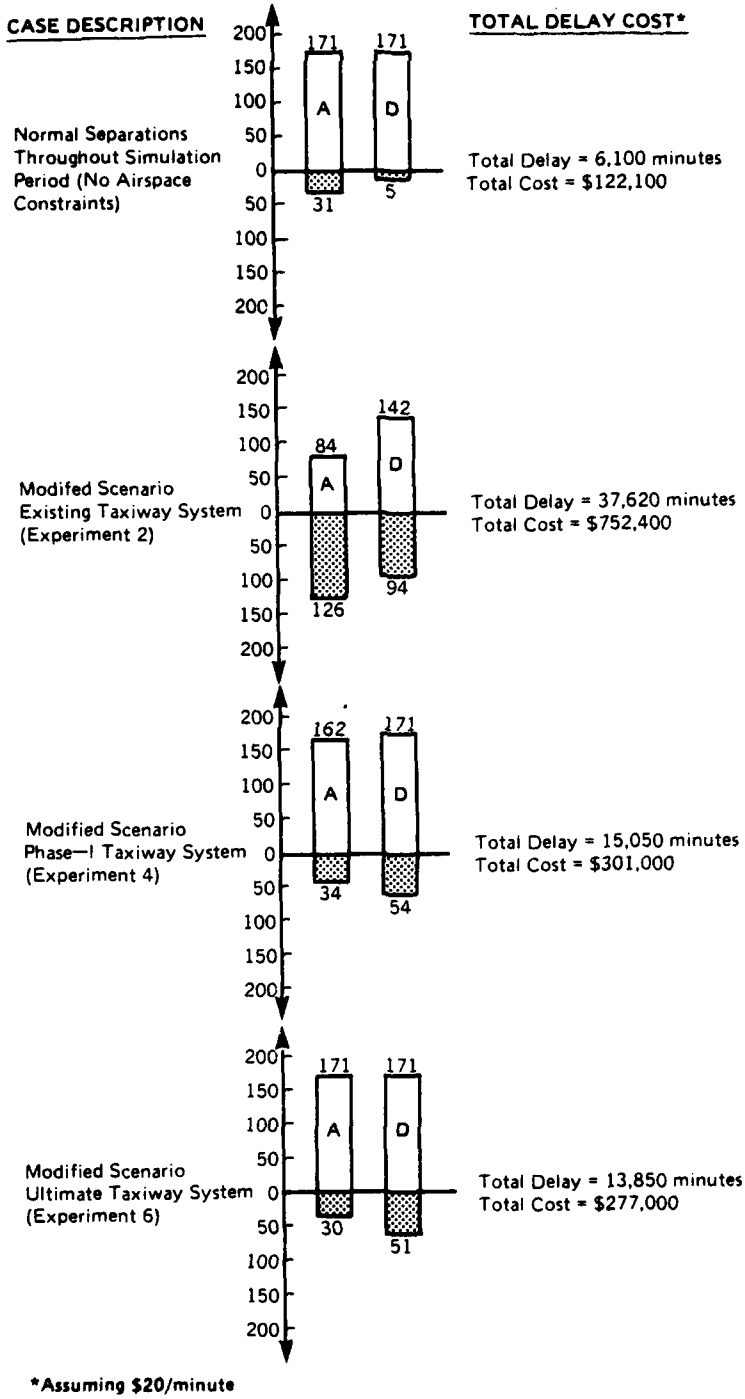
Exhibit D—3

New York Task Force
LaGuardia Airport

WEST TAXIWAY RESULTS
MODIFIED SCENARIO
EXPERIMENTS 2, 4, AND 6

PMM&Co. February 1980

NORMAL SEPARATIONS IN FIRST HOUR
ARRIVALS AND DEPARTURES ON RUNWAY 4



*Assuming $20/minute

Exhibit D—4

New York Task Force
LaGuardia Airport

WEST TAXIWAY RESULTS
MODIFIED SCENARIO
EXPERIMENTS 2, 4, AND 6

PMM&Co. February 1980

Table D-1

SENSITIVITY TESTS OF FIRST-HOUR
DEPARTURE CONGESTION
Total Flow Rates: 5-hour simulation period
Arrivals on Runway 22; Departures on Runway 13
(Experiments 1, 3, and 5)

First-hour separations between departures	Arrival flow rates			Departures flow rates		
	Existing(1)[a]	Phase I(3)	Ultimate(5)	Existing(1)	Phase I(3)	Ultimate(5)
Normal	116.3	150.8	157.4	162.8	171.0	171.0
10 minutes	88.9	128.1	127.1	145.9	167.9	164.9
20 minutes	83.2	89.2	89.4	136.9	155.6	155.5
60 minutes	72.0	79.4	81.1	132.7	144.2	144.4

a. Experiment numbers are shown in parentheses.

Table D-2

SENSITIVITY TESTS OF FIRST-HOUR
DEPARTURE CONGESTION
Average Delays: entire simulation period
Arrivals on Runway 22; Departures on Runway 13
(Experiments 1, 3, and 5)

First-hour separations between departures	Arrival flow rates			Departures flow rates		
	Existing(1)[a]	Phase I(3)	Ultimate(5)	Existing(1)	Phase I(2)	Ultimate(5)
Normal	83.1	46.9	40.7	71.7	56.0	56.0
10 minutes	121.4	69.5	67.5	98.1	75.7	75.1
20 minutes	128.7			117.6		
60 minutes	145.8	126.0	123.1	127.0	116.1	116.0

a. Experiment numbers are shown in parentheses.

Table D-3

SENSITIVITY TESTS OF FIRST-HOUR
DEPARTURE CONGESTION
Total Flow Rates: 5-hour simulation period
Arrivals and Departures on Runway 4
(Experiments 2, 4, and 6)

First-hour separations between departures	Arrival flow rates			Departures flow rates		
	Existing(2)[a]	Phase I(4)	Ultimate(6)	Existing(2)	Phase I(4)	Ultimate(6)
Normal	84.4	162.5	171.0	142.0	170.9	171.0
10 minutes	59.2	98.6	131.4	122.2	151.2	154.4
20 minutes	58.9	82.9	127.4	110.9	138.1	145.5
60 minutes	54.1	80.1	93.8	108.5	131.2	136.9

a. Experiment numbers are shown in parentheses.

Table D-4

SENSITIVITY TESTS OF FIRST-HOUR
DEPARTURE CONGESTION
Average Delays: entire simulation period
Arrivals and Departures on Runway 4
(Experiments 2, 4, and 6)

First-hour separations between departures	Average arrival delays (minutes)			Average departure delays (minutes)		
	Existing(2)[a]	Phase I(4)	Ultimate(6)	Existing(2)	Phase I(4)	Ultimate(6)
Normal	126.2	34.3	30.0	94.3	54.4	51.2
10 minutes	171.8	107.1	59.8	135.2	92.2	87.3
20 minutes	172.0			157.2		
60 minutes	178.1	125.9	108.7	163.1	133.1	124.1

a. Experiment numbers are shown in parentheses.

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 1
Modified Scenario

Arrivals on Runway 22
Departures on Runway 13

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	4.00	2.00	0.00	1.00	7.00	0.95	2.48	0.00	0.20	1.28	6.80	0.92
15: 15	0.00	1.00	1.80	2.00	4.80	0.00	0.01	0.09	0.01	0.04	7.20	7.87
15: 30	3.00	0.00	1.20	4.00	8.20	0.42	0.00	0.03	1.44	0.87	7.60	6.52
15: 45	3.00	1.00	1.00	1.00	6.00	0.37	0.67	1.00	0.34	0.52	7.20	5.23
16: 0	1.00	5.80	1.90	0.00	8.70	10.38	3.44	3.30	0.00	4.24	7.30	8.94
16: 15	1.00	0.20	1.90	1.80	4.90	20.92	0.81	13.47	10.28	13.26	7.70	5.69
16: 30	1.00	0.00	1.00	0.20	2.20	31.27	0.00	20.42	4.14	25.36	7.00	10.19
16: 45	0.90	0.00	1.00	0.70	2.60	33.02	0.00	33.66	20.85	33.79	7.10	18.24
17: 0	1.20	0.00	1.00	1.10	3.30	44.70	0.00	39.58	36.54	40.21	7.70	19.79
17: 15	2.00	0.00	0.90	0.70	3.60	40.45	0.00	47.58	37.80	45.97	7.60	23.34
17: 30	1.80	0.10	0.50	0.80	3.20	41.50	6.08	33.06	51.50	50.70	7.30	21.77
17: 45	1.70	0.70	0.60	1.00	4.00	54.36	44.66	43.41	77.48	64.78	7.10	26.75
18: 0	1.60	0.10	0.20	0.90	2.80	56.94	7.78	17.11	79.70	70.15	3.10	35.96
18: 15	0.70	0.00	0.00	1.00	1.70	42.65	0.00	0.00	88.15	82.67	3.30	48.08
18: 30	0.90	0.10	0.00	0.70	1.70	54.37	11.41	0.00	76.39	80.29	1.90	52.73
18: 45	1.00	0.60	0.00	1.90	3.50	100.53	65.71	0.00	122.41	113.77	0.20	6.85
19: 0	2.80	3.50	1.90	1.20	9.40	90.34	120.69	124.80	132.37	113.74	0.00	0.00
19: 15	2.20	3.60	3.80	1.40	11.00	101.32	124.90	114.21	119.13	115.64	0.00	0.00
19: 30	4.20	2.30	4.50	1.50	12.50	91.99	110.82	114.49	104.66	104.87	0.00	0.00
19: 45	3.60	3.40	4.30	1.60	12.90	79.07	109.95	102.08	90.26	99.31	0.00	0.00
20: 0	2.70	2.50	5.20	2.30	12.70	81.31	89.26	111.59	104.11	105.61	1.00	60.02
20: 15	3.60	2.00	3.40	3.50	12.50	85.02	100.20	96.39	99.67	98.02	5.00	157.60
20: 30	3.30	3.80	2.90	1.90	11.90	80.72	84.49	83.03	75.72	90.42	7.20	160.04
20: 45	3.80	0.80	1.20	5.90	11.70	74.31	24.56	56.87	84.90	81.57	7.40	164.07
21: 0	2.00	2.50	1.80	1.90	8.20	124.27	53.35	74.11	142.22	104.75	7.20	170.34
21: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.90	173.38
21: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	171.13
21: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.10	173.45
22: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	175.92
22: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.60	175.81
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.50	163.68
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.10	54.69
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	33.82
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TOTAL ARRIVALS = 171.00
TOTAL DEPARTURES = 171.00
AVG. ARRIVAL DELAY = 83.08
AVG. DEPARTURE DELAY = 71.70

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 2
Modified Scenario
Arrivals and Departures on Runway 4

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	4.00	2.00	0.00	1.00	7.00	2.05	1.82	0.00	1.22	1.86	6.60	0.93
15: 15	0.00	1.00	1.00	2.00	4.00	0.00	0.00	0.00	0.00	0.00	7.40	7.78
15: 30	2.00	0.00	2.00	4.00	8.00	0.38	0.00	0.10	1.39	0.82	7.50	6.55
15: 45	3.00	1.00	1.00	1.00	6.00	1.22	0.21	1.23	0.62	0.95	7.50	5.41
16: 0	2.00	1.90	1.90	0.00	5.80	4.12	6.76	8.27	0.00	6.33	7.00	9.01
16: 15	1.00	3.20	0.90	0.10	5.20	18.71	20.59	18.02	1.90	20.54	7.30	5.79
16: 30	1.00	0.90	1.20	0.90	4.00	29.08	20.87	25.55	18.96	24.90	6.70	10.33
16: 45	1.00	0.00	0.00	1.00	2.00	34.41	0.00	0.00	35.61	35.01	7.30	19.42
17: 0	1.00	0.00	0.10	0.00	1.10	44.70	0.00	5.03	0.00	44.98	7.20	21.14
17: 15	0.00	0.00	1.90	1.00	2.90	0.00	0.00	61.19	60.67	60.96	6.90	25.06
17: 30	0.00	0.00	0.80	0.90	1.70	0.00	0.00	54.77	65.31	63.74	5.00	28.72
17: 45	0.00	0.00	1.10	0.90	2.00	0.00	0.00	75.89	73.37	78.12	1.50	35.82
18: 0	0.00	0.00	0.40	1.00	1.40	0.00	0.00	37.97	95.40	95.52	4.70	46.36
18: 15	0.20	0.00	0.70	0.30	1.20	23.19	0.00	70.34	31.68	93.33	0.50	11.75
18: 30	0.80	0.00	0.00	0.90	1.70	94.77	0.00	0.00	104.86	105.56	0.30	6.72
18: 45	0.90	0.90	0.00	2.00	3.80	118.36	118.91	0.00	125.08	128.31	0.00	0.00
19: 0	2.00	0.10	0.90	2.00	5.00	135.37	13.67	125.00	136.47	136.47	0.00	0.00
19: 15	2.00	3.60	0.10	1.00	6.70	140.12	138.74	14.29	137.21	138.98	0.00	0.00
19: 30	3.20	4.40	3.00	1.60	12.20	121.41	120.11	102.99	84.10	111.28	0.00	0.00
19: 45	3.90	2.00	4.90	1.50	12.30	103.61	99.07	124.64	133.94	114.20	0.90	131.68
20: 0	4.00	3.40	3.10	1.00	11.50	146.96	151.36	149.61	145.62	148.83	0.10	16.47
20: 15	3.60	2.70	4.00	1.90	12.20	144.07	144.21	146.61	150.57	146.00	0.00	0.00
20: 30	2.50	1.90	5.00	2.70	12.10	138.25	139.70	135.89	135.61	136.92	0.00	0.00
20: 45	4.00	1.60	3.40	3.20	12.20	120.85	121.66	118.64	121.01	120.19	0.00	0.00
21: 0	4.00	2.40	1.60	2.60	10.60	113.01	120.52	118.20	112.09	115.19	0.00	0.00
21: 15	2.90	3.00	1.70	4.60	12.20	111.05	112.63	109.72	110.27	111.01	0.20	48.41
21: 30	4.00	0.00	1.30	0.90	6.20	133.25	0.00	102.01	99.20	123.67	6.40	222.49
21: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.20	253.45
22: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.50	256.32
22: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.10	259.15
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.10	265.11
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	271.10
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.70	271.17
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.10	257.98
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.20	232.59
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	232.49

TOTAL ARRIVALS = 156.30
TOTAL DEPARTURES = 171.00
AVG. ARRIVAL DELAY = 126.23
AVG. DEPARTURE DELAY = 94.26

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 3
Modified Scenario
Arrivals on Runway 22
Departures on Runway 13

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	4.00	2.00	0.00	1.00	7.00	1.20	0.98	0.00	2.00	1.25	6.70	0.90
15: 15	0.00	1.00	1.00	2.00	4.00	0.00	0.01	0.00	0.02	0.01	7.20	7.78
15: 30	2.00	0.00	2.00	4.00	8.00	1.14	0.00	0.56	1.39	1.12	7.90	6.62
15: 45	3.00	1.00	1.00	1.00	6.00	1.05	0.19	0.94	0.01	0.71	7.00	5.41
16: 0	2.00	6.00	1.90	1.00	10.90	5.31	2.56	3.47	2.24	3.21	6.70	9.32
16: 15	0.90	0.00	1.70	2.00	4.60	18.40	0.00	13.87	0.38	9.14	7.40	7.02
16: 30	0.90	0.60	1.00	2.60	5.10	26.93	0.21	21.82	4.23	11.91	6.80	10.78
16: 45	0.90	0.40	0.90	1.40	3.60	31.99	0.57	30.75	15.70	23.82	7.50	19.48
17: 0	1.10	0.90	1.00	2.00	5.00	40.90	0.95	41.43	20.68	26.69	7.10	22.03
17: 15	0.80	0.90	0.70	1.00	3.40	34.23	15.66	34.25	35.36	36.58	7.80	25.43
17: 30	0.80	1.00	0.80	1.00	3.60	38.59	24.87	47.77	50.88	48.07	7.10	23.88
17: 45	1.30	1.60	1.00	1.00	4.90	58.52	47.30	74.19	56.79	59.21	7.40	28.19
18: 0	1.20	0.60	1.00	0.90	3.70	65.61	38.16	70.51	48.07	66.07	7.00	34.41
18: 15	0.40	0.30	0.30	0.90	1.90	36.52	23.95	22.01	41.54	65.67	7.50	39.61
18: 30	0.90	0.60	0.50	0.50	2.50	79.63	41.30	42.24	24.70	81.09	7.50	41.42
18: 45	2.40	2.70	0.50	0.70	6.30	90.17	72.17	39.14	17.77	77.53	7.00	43.88
19: 0	3.20	3.30	2.10	1.00	9.60	89.39	67.63	61.58	56.50	78.18	0.40	14.51
19: 15	3.60	3.20	3.50	1.30	11.60	79.98	88.42	90.21	84.47	85.18	2.10	47.44
19: 30	3.90	2.30	4.70	1.70	12.60	90.14	71.74	118.52	87.70	100.90	2.80	49.77
19: 45	2.70	2.20	4.50	3.00	12.40	92.23	60.66	109.04	72.73	89.38	5.50	60.38
20: 0	4.60	3.30	3.10	1.80	12.80	94.87	53.77	97.15	60.42	81.88	5.50	58.48
20: 15	4.60	1.20	4.70	1.90	12.40	75.15	28.21	84.05	39.60	76.27	5.50	57.77
20: 30	4.10	0.90	3.40	3.30	11.70	76.58	54.56	69.15	68.96	75.92	6.50	104.68
20: 45	3.70	0.00	0.70	3.00	7.40	62.55	0.00	24.42	53.99	74.66	7.40	106.81
21: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	101.75
21: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	76.85
21: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.20	45.41
21: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	46.26
22: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.30	44.73
22: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40	37.44
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TOTAL ARRIVALS = 171.00
TOTAL DEPARTURES = 171.00
AVG. ARRIVAL DELAY = 46.92
AVG. DEPARTURE DELAY = 56.04

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 4
Modified Scenario

Arrivals and Departures on Runway 4

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	4.00	2.00	0.00	1.00	7.00	1.09	0.70	0.00	2.91	1.24	6.60	0.90
15: 15	0.00	1.00	1.00	1.00	3.00	0.00	0.00	0.00	0.00	0.00	7.30	7.69
15: 30	1.90	0.00	2.00	5.00	8.90	0.67	0.00	0.47	0.99	0.80	8.00	6.23
15: 45	3.10	1.00	1.00	1.00	6.10	1.43	0.29	0.51	0.43	0.92	7.40	4.90
16: 0	1.60	4.70	2.70	1.00	10.00	3.23	3.50	2.24	1.36	2.98	7.00	8.34
16: 15	0.90	1.30	3.00	2.00	7.20	16.74	5.39	2.29	0.23	4.20	7.30	5.39
16: 30	0.90	0.90	2.80	2.20	6.80	25.36	0.14	3.66	3.22	5.90	6.80	10.31
16: 45	1.00	0.10	1.00	1.80	3.90	36.64	0.05	3.37	15.89	17.61	7.30	18.54
17: 0	1.10	0.90	0.20	2.00	4.20	39.04	3.88	4.50	22.00	23.72	7.60	20.12
17: 15	1.00	0.70	0.20	0.70	2.60	41.34	13.26	5.47	25.20	36.87	7.90	23.85
17: 30	0.80	0.80	0.90	0.90	3.40	40.31	22.95	20.82	42.29	39.68	7.20	21.94
17: 45	1.30	0.60	1.00	1.00	3.90	57.13	21.61	30.21	55.80	49.80	7.20	27.14
18: 0	1.20	0.80	1.00	1.00	4.00	55.79	37.35	38.54	56.86	57.04	7.20	33.04
18: 15	0.40	0.50	0.10	0.80	1.80	33.55	37.78	5.03	44.21	67.36	7.30	38.02
18: 30	1.00	0.30	0.20	0.80	2.30	89.19	28.68	13.11	45.71	81.17	7.30	39.99
18: 45	2.80	1.60	1.20	1.50	7.10	100.23	91.36	62.21	67.52	89.20	7.40	43.32
19: 0	3.50	2.20	1.40	0.40	7.50	94.67	87.09	64.43	27.83	93.17	7.50	50.27
19: 15	3.80	1.80	2.90	1.30	9.80	92.01	86.37	100.81	43.85	91.84	7.10	54.19
19: 30	3.80	3.70	3.50	1.70	12.70	86.62	101.90	100.02	56.04	91.34	6.10	39.69
19: 45	2.40	4.60	4.00	1.70	12.70	78.50	74.69	93.66	56.16	76.08	6.30	40.76
20: 0	3.50	3.30	4.70	1.10	12.60	69.20	62.42	74.68	35.25	70.52	6.00	44.00
20: 15	4.10	2.90	2.30	2.20	11.50	63.69	71.32	46.00	70.85	67.87	5.80	43.82
20: 30	4.30	0.30	3.50	4.30	12.40	72.82	9.22	89.22	67.18	75.78	5.30	35.53
20: 45	4.50	0.00	1.40	3.60	9.50	119.90	0.00	97.18	118.32	115.22	1.70	30.12
21: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	30.42
21: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	29.41
21: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.60	30.32
21: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.70	30.59
22: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	29.63
22: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	25.41
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TOTAL ARRIVALS = 171.00
TOTAL DEPARTURES = 170.90
AVG. ARRIVAL DELAY = 34.32
AVG. DEPARTURE DELAY = 54.42

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 5
Modified Scenario
Arrivals on Runway 22
Departures on Runway 13

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	4.00	2.00	0.00	1.00	7.00	1.51	1.59	0.00	0.20	1.35	6.80	0.95
15: 15	0.00	1.00	1.00	2.00	4.00	0.00	0.01	0.00	0.01	0.01	7.20	7.63
15: 30	2.00	0.00	2.00	4.00	8.00	1.04	0.00	0.47	1.41	1.08	7.40	6.82
15: 45	3.00	1.00	1.00	1.00	6.00	1.07	0.35	1.08	0.01	0.77	6.80	5.93
16: 0	1.80	5.20	1.90	0.80	9.70	4.54	2.95	3.52	1.50	3.37	7.20	9.95
16: 15	1.00	0.80	1.80	2.20	5.80	19.97	3.33	14.22	0.67	8.72	7.40	7.32
16: 30	0.90	0.80	0.70	2.50	4.90	27.11	0.33	15.46	3.86	10.97	7.10	10.69
16: 45	1.00	0.20	0.90	1.80	3.90	36.64	0.24	27.83	15.57	23.96	7.20	19.72
17: 0	0.90	1.10	0.80	1.70	4.50	30.68	1.92	32.98	22.20	24.81	7.40	21.61
17: 15	0.80	0.60	1.00	1.00	3.40	30.65	8.01	44.14	35.48	38.00	8.00	25.21
17: 30	1.40	1.00	0.90	1.00	4.30	42.26	25.48	53.77	51.11	48.54	7.00	23.03
17: 45	1.60	1.60	0.90	0.90	5.00	54.94	46.29	66.36	50.97	57.45	7.00	27.83
18: 0	0.60	1.30	1.00	0.80	3.70	46.09	56.68	71.73	42.79	63.54	7.40	33.96
18: 15	0.40	0.30	0.30	0.90	1.90	33.56	22.24	24.24	38.66	67.83	7.10	39.46
18: 30	0.90	0.70	0.50	0.40	2.50	58.54	47.39	39.48	16.70	78.94	7.30	41.87
18: 45	2.20	2.50	0.50	0.90	6.10	100.41	76.95	28.92	46.02	81.35	7.30	44.74
19: 0	3.40	2.90	1.50	1.40	9.20	98.33	51.43	36.27	55.71	73.65	5.10	40.87
19: 15	4.00	3.30	3.50	1.00	11.80	74.69	86.85	83.75	83.05	82.42	5.50	39.17
19: 30	3.30	1.90	5.10	1.70	12.00	70.60	80.08	117.89	80.60	98.80	5.20	36.49
19: 45	2.90	2.00	5.20	2.70	12.80	88.14	61.42	109.78	74.84	91.36	5.20	37.03
20: 0	3.50	2.40	4.20	2.40	12.50	93.01	60.45	93.20	69.64	84.86	5.10	40.54
20: 15	4.60	2.00	3.30	2.30	12.20	86.02	56.80	74.95	45.15	77.05	5.50	41.12
20: 30	4.30	1.40	3.20	3.20	12.10	79.01	62.73	69.19	76.35	77.52	6.90	78.13
20: 45	4.50	0.00	0.80	2.40	7.70	66.46	0.00	23.18	52.56	77.38	3.40	56.08
21: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.20	46.85
21: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.40	45.28
21: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.10	46.49
21: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.30	47.72
22: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.30	47.32
22: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	34.97
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	10.62
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TOTAL ARRIVALS = 171.00
TOTAL DEPARTURES = 171.00
AVG. ARRIVAL DELAY = 40.71
AVG. DEPARTURE DELAY = 56.02

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

LaGUARDIA WEST TAXIWAY EXPERIMENT NUMBER 6
Modified Scenario
Arrivals and Departures on Runway 4

AIRFIELD SIMULATION MODEL VERSION4 SUMMARY

TIME PERIOD	AVERAGE DEPARTURE FLOW RATES					AVERAGE DEPARTURE DELAYS					ARR. FLOWS	ARR. DELAY
	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL	RWY. 1	RWY. 2	RWY. 3	RWY. 4	TOTAL		
15: 0	4.00	2.00	0.00	1.00	7.00	1.30	0.94	0.00	0.20	1.04	6.70	0.90
15: 15	0.00	1.00	1.00	1.00	3.00	0.00	0.00	0.00	0.00	0.00	7.40	7.51
15: 30	1.90	0.00	2.00	5.00	8.90	1.02	0.00	0.00	1.07	0.79	7.50	6.34
15: 45	3.10	1.00	1.00	1.00	6.10	0.39	0.89	1.25	0.35	0.61	7.50	5.29
16: 0	1.80	3.50	2.60	0.70	8.60	4.19	2.69	1.98	1.38	2.82	6.70	9.34
16: 15	0.90	2.50	3.10	2.30	8.80	17.67	7.22	2.32	0.81	5.00	7.50	6.26
16: 30	0.80	0.00	2.80	2.70	6.30	23.18	0.00	3.87	4.24	6.84	6.40	10.42
16: 45	0.90	1.00	1.00	1.40	4.30	32.00	0.22	2.99	16.36	13.48	7.60	19.25
17: 0	1.10	0.60	0.10	1.90	3.70	30.21	1.74	4.35	20.56	24.31	7.30	21.29
17: 15	1.10	0.60	1.00	1.00	3.70	41.72	6.42	4.64	34.82	27.60	7.80	24.78
17: 30	1.20	0.70	1.00	1.00	3.90	56.00	19.63	9.31	50.30	37.81	7.30	23.25
17: 45	0.70	1.20	1.00	1.00	3.90	29.82	34.93	20.84	55.61	43.71	7.40	27.65
18: 0	0.80	1.20	1.00	0.90	3.90	42.72	48.91	30.06	47.16	53.18	7.40	33.03
18: 15	0.10	0.70	0.10	0.90	1.80	8.59	55.31	5.15	46.41	64.14	7.60	38.09
18: 30	1.20	0.30	0.60	1.00	3.10	69.93	26.37	32.83	58.39	77.61	7.90	39.34
18: 45	2.60	1.20	1.50	1.10	6.40	104.47	62.40	59.62	58.43	87.28	6.90	43.11
19: 0	3.20	1.90	1.60	1.90	8.60	100.78	83.02	87.75	51.17	85.16	7.20	50.27
19: 15	4.30	2.00	2.10	2.30	10.70	98.16	88.34	81.46	46.99	84.75	7.80	54.40
19: 30	4.10	3.50	3.40	1.70	12.70	91.75	98.81	85.77	45.13	86.82	7.60	50.49
19: 45	3.40	4.00	4.60	0.80	12.80	91.54	81.87	91.33	30.03	86.19	7.80	51.09
20: 0	4.90	3.80	3.60	0.40	12.70	78.85	65.74	72.74	11.22	74.60	7.50	55.44
20: 15	3.80	2.20	4.80	1.30	12.10	69.99	48.88	67.90	39.97	68.78	7.70	55.08
20: 30	4.90	1.00	1.90	4.50	12.30	65.66	15.97	33.23	69.80	68.70	6.90	44.26
20: 45	2.20	0.10	0.20	3.20	5.70	40.49	6.84	5.88	69.47	76.58	1.60	16.29
21: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23: 45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TOTAL ARRIVALS = 171.00
TOTAL DEPARTURES = 171.00
AVG. ARRIVAL DELAY = 29.87
AVG. DEPARTURE DELAY = 51.15

Runway 1 = S.W. Runway 3 = HUO
Runway 2 = SBJ Runway 4 = MARES

Attachment E

SUMMARY OF CASE-SPECIFIC SEPARATION INPUTS

LaGuardia Airport

and

John F. Kennedy International Airport

New York
Airport Improvement Task Force Delay Studies

Peat, Marwick, Mitchell & Co.
San Francisco, California

February 1980

CASE-SPECIFIC SEPARATION INPUTS
New York Task Force

LAGUARDIA AIRPORT

The arrival-arrival and departure-departure separations used in the LaGuardia Airport experiments were presented in Data Package No. 6, Attachment E, pp. 101-104. Those separations depend only on weather conditions and the year except in the case of the interaction with Teterboro operations (Experiment 10A), which results in 15-mile separations between arrivals.

For mixed operations on a single runway, there are standard departure-arrival and arrival-departure separations that depend only on weather and runway clearance times. For departure-arrival and arrival-departure separations on intersecting runways, however, one must derive values for each specific runway use. The values for these two types of separations, adopted by the Task Force in 1976, are reported in the New York Task Force Interim Report: "Kennedy and LaGuardia Runway Capacity," August 1, 1976. The departure-arrival and arrival-departure separations from that report are summarized below for each combination of runway use and weather conditions. The corresponding values assumed for future years are also presented.

Case 1 - Arrivals 22, Departures 13, VFR 1 (1,19,31,37)[a]

Departure-Arrival Separations (nautical miles):[b]

Today:	0.4 miles, all aircraft classes
Today:	0.4 miles, all aircraft classes
Today:	0.4 miles, all aircraft classes

Arrival-Departure Separations:[c]

Today:	10 seconds, all aircraft classes
1982:	10 seconds, all aircraft classes
1987:	10 seconds, all aircraft classes

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a. Experiment numbers are shown in parentheses.
b. Closest distance in nautical miles of arrival from runway threshold at which a departure can be released on an intersecting runway.
c. Earliest time in seconds after arrival crosses runway threshold before departure can be released on an intersecting runway.

Case 2 - Arrivals 22, Departures 13, IFR 1 (2,32,38,48-55)

Departure-Arrival Separations (nautical miles):[a]

Today: 0.4 miles, all aircraft classes
Today: 0.4 miles, all aircraft classes
Today: 0.4 miles, all aircraft classes

Arrival-Departure Separations:[b]

Today: 10 seconds, all aircraft classes
1982: 10 seconds, all aircraft classes
1987: 10 seconds, all aircraft classes

Case 3 - Arrivals 22, Departures 13, IFR 2 (3,11,20,36,41)

Departure-Arrival Separations (nautical miles):

Today: 2.1 miles, all aircraft classes
Today: 2.1 miles, all aircraft classes
Today: 2.1 miles, all aircraft classes

Arrival-Departure Separations (seconds):

			Trail Aircraft			
			A	B	C	D
Today, 1982, 1987: (time to taxiway E)	Lead Aircraft	A	45	45	45	45
		B	35	35	35	35
		C	35	35	35	35
		D	32	32	32	32

Case 10 - Arrivals 31, Departures 4, VFR 1 (42,44)

Departure-Arrival Separations (nautical miles):

			Trail Aircraft			
			A	B	C	D
Today, 1987:	Lead Aircraft	A	1a	1	1	1
		B	1a	1	1	1
		C	1a	1	1	1
		D	1.75[c]	1.75[c]	1.75[c]	1.75[c]

a. Closest distance in nautical miles of arrival from runway threshold at which a departure can be released on an intersecting runway.
b. Earliest time in seconds after arrival crosses runway threshold before departure can be released on an intersecting runway.
c. PMM&Co. estimates based on discussions with the LGA Tower.

Arrival-Departure Separations (seconds):

			Trail Aircraft			
			A	B	C	D
Today, 1987:		A	0	0	0	0
	Lead	B	20	20	20	20
	Aircraft	C	20	20	20	20
		D	20[a]	20[a]	20[a]	20[a]

Case 15 - Arrivals 4, Departures 31, IFR 2 (4)

Departure-Arrival Separations (nautical miles):

			Trail Aircraft			
			A	B	C	D
Today:		A	2.6	2.6	2.7	2.8
	Lead	B	2.4	2.4	2.5	2.6
	Aircraft	C	2.4	2.4	2.5	2.6
		D	2.4	2.4	2.5	2.6

Arrival-Departure Separations (seconds):

			Trail Aircraft			
			A	B	C	D
Today:		A	56	56	56	56
	Lead	B	47	47	47	47
	Aircraft	C	47	47	47	47
		D	47	47	47	47

Case 16 - Arrivals 4, Departures 13, VFR 1 (5)

Departure-Arrival Separations (nautical miles):

Today: 0.25 miles, all aircraft classes

Arrival-Departure Separations (seconds):

			Trail Aircraft			
			A	B	C	D
Today:		A	10	10	10	10
	Lead	B	33	33	33	33
	Aircraft	C	33	33	33	33
		D	47	47	47	47

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a. PMM&Co. estimates based on discussions with the LGA Tower.

Case 19 - Arrivals 13, Departures 4, VFR 1 (33,34,39)

Departure-Arrival Separations (nautical miles):

			Trail Aircraft A	B	C	D
Today, 1982:		A	1.9	2.0	2.1	2.3
	Lead	B	1.8	1.8	1.9	2.1
	Aircraft	C	1.8	1.8	1.9	2.1
		D	4.4	4.9	5.3	5.7
1987:		A	1.9	2.0	2.1	2.3
	Lead	B	1.8	1.8	1.9	2.1
	Aircraft	C	1.8	1.8	1.9	2.1
		D	3.4	3.9	4.3	4.7

Arrival-Departure Separations (seconds):

			Trail Aircraft A	B	C	D
Today, 1982:		A	5	5	5	5
	Lead	B	5	5	5	5
	Aircraft	C	5	5	5	5
		D	92	92	92	92
1987:		A	5	5	5	5
	Lead	B	5	5	5	5
	Aircraft	C	5	5	5	5
		D	60	60	60	60

Case 20 - Arrivals 13, Departures 4, IFR 1 (9,35,40)

Departure-Arrival Separations (nautical miles):

			Trail Aircraft A	B	C	D
Today, 1982:		A	1.9	2.0	2.1	2.3
	Lead	B	1.8	1.8	1.9	2.1
	Aircraft	C	1.8	1.8	1.9	2.1
		D	4.4	4.9	5.3	5.7
1987:		A	1.9	2.0	2.1	2.3
	Lead	B	1.8	1.8	1.9	2.1
	Aircraft	C	1.8	1.8	1.9	2.1
		D	3.4	3.9	4.3	4.7

Arrival-Departure Separations (seconds):

			Trail Aircraft A	B	C	D
Today, 1982:		A	5	5	5	5
	Lead	B	5	5	5	5
	Aircraft	C	5	5	5	5
		D	92	92	92	92
1987:		A	5	5	5	5
	Lead	B	5	5	5	5
	Aircraft	C	5	5	5	5
		D	60	60	60	60

Case 23, - Arrivals 13, Departures 13, IFR 1 (7)

Arrival-Arrival Separations (nautical miles):

Today: 7 miles when alternating departures between arrivals

JOHN F. KENNEDY INTERNATIONAL AIRPORT

The standard arrival-arrival and departure-departure separations used in the John F. Kennedy International Airport experiments were presented in Data Package No. 6, Attachment F, pp. 105-108. This section describes only those case-specific separations that differ from the standard ones. As in the case of LaGuardia Airport, these case-specific separations are from the New York Task Force Interim Report dated August 1, 1976.

Case 1, Arrivals 13R, 22L, 22R; Departures 22R; VFR 1 (1,30,39)

Departure(22R) - Arrival(13R) Separations (nautical miles):[a]

			Trail Aircraft B	C	D
Today, 1982, and 1987	Lead Aircraft	B	0.5	0.5	0.5
		C	0.5	0.5	0.5
		D	0.5	0.5	0.5

Arrival(13R) - Departure(22R) Separations: (seconds)[b]

Today: 10 seconds, all aircraft classes
1982: 10 seconds, all aircraft classes
1987: 10 seconds, all aircraft classes

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a. Closest distance of arrival from runway threshold at which a departure can be released on an intersecting runway.
b. Earliest time after arrival crosses runway threshold before departure can be released on an intersecting runway.

Case 2 - Arrivals 22L, Departures 22R, IFR 1 (2,2A,19,26,35,44,45)

Departure-Departure Separations: (seconds)[a]

			Trail Aircraft		
			B	C	D
Today, 1982:		B	60	60	64
	Lead	C	60	60	64
	Aircraft	D	120	120	90
1987:		B	60	60	64
	Lead	C	60	60	64
	Aircraft	D	60	60	64

Case 4 Arrivals 4L, 4R; Departures 4L; VFR 1 (3)

Arrival-Arrival Separations: (nautical miles)[b]

			Trail Aircraft		
			B	C	D
Today, 1982:		B	8.0	8.0	8.0
	Lead	C	8.0	8.0	8.0
	Aircraft	D	8.0	8.0	8.0

Departure-Departure Separations: (seconds)

			Trail Aircraft		
			B	C	D
Today, 1982:		B	75	75	83
	Lead	C	75	75	83
	Aircraft	D	120	120	90
1987:		B	75	75	83
	Lead	C	75	75	83
	Aircraft	D	75	75	83

(Based on 6-mile common departure path)

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a. Average time between release of departing aircraft on the same runway under saturation conditions.
b. On 4L when departure peak on 4L.

Case 5 - Arrivals 4R, Departures 4L, IFR 1 (4,33,42)

Departure-Departure Separations: (seconds)

			Trail Aircraft B	C	D
Today, 1982:		B	75	75	83
	Lead	C	75	75	83
	Aircraft	D	120	120	90
1987:		B	75	75	83
	Lead	C	75	75	83
	Aircraft	D	75	75	83

Case 7 - Arrivals 31L, 31R; Departures 31L, 31R; VFR 1 (5,16,32,41)

Departure-Departure Separations: (seconds)

			Trail Aircraft B	C	D
Today, 1982:		B	75	75	83
	Lead	C	75	75	83
	Aircraft	D	120	120	90

			Trail Aircraft B	C	D
1987:		B	75	75	83
	Lead	C	75	75	83
	Aircraft	D	75	75	83

Case 8 - Arrivals 31R (31L), Departures 31L (31R), IFR 1 (6,15,34,43)

Departure-Departure Separations: (seconds)

			Trail Aircraft B	C	D
Today, 1982:		B	75	75	83
	Lead	C	75	75	83
	Aircraft	D	120	120	90
1987:		B	75	75	83
	Lead	C	75	75	83
	Aircraft	D	75	75	83

Case 10 - Arrivals 13L, 13R; Departures 13R; VFR 1 (7,31,40)

Arrival-Arrival Separations: (nautical miles)

		Trail Aircraft		
		B	C	D
Today, 1982, 1987	B	4.1	4.1	4.2
Lead	C	4.1	4.1	4.2
Aircraft	D	4.1	4.1	4.2

(Separations achieved by assigning approximately 25% of arrivals to 13R)

Case 11 - Arrivals 13L, Departures 13R, IFR 1 (8)

Arrival-Arrival Separations: (nautical miles)

		Trail Aircraft		
		B	C	D
Today:	B	5.0	5.0	5.0
Lead	C	5.0	5.0	5.0
Aircraft	D	5.0	5.0	5.0